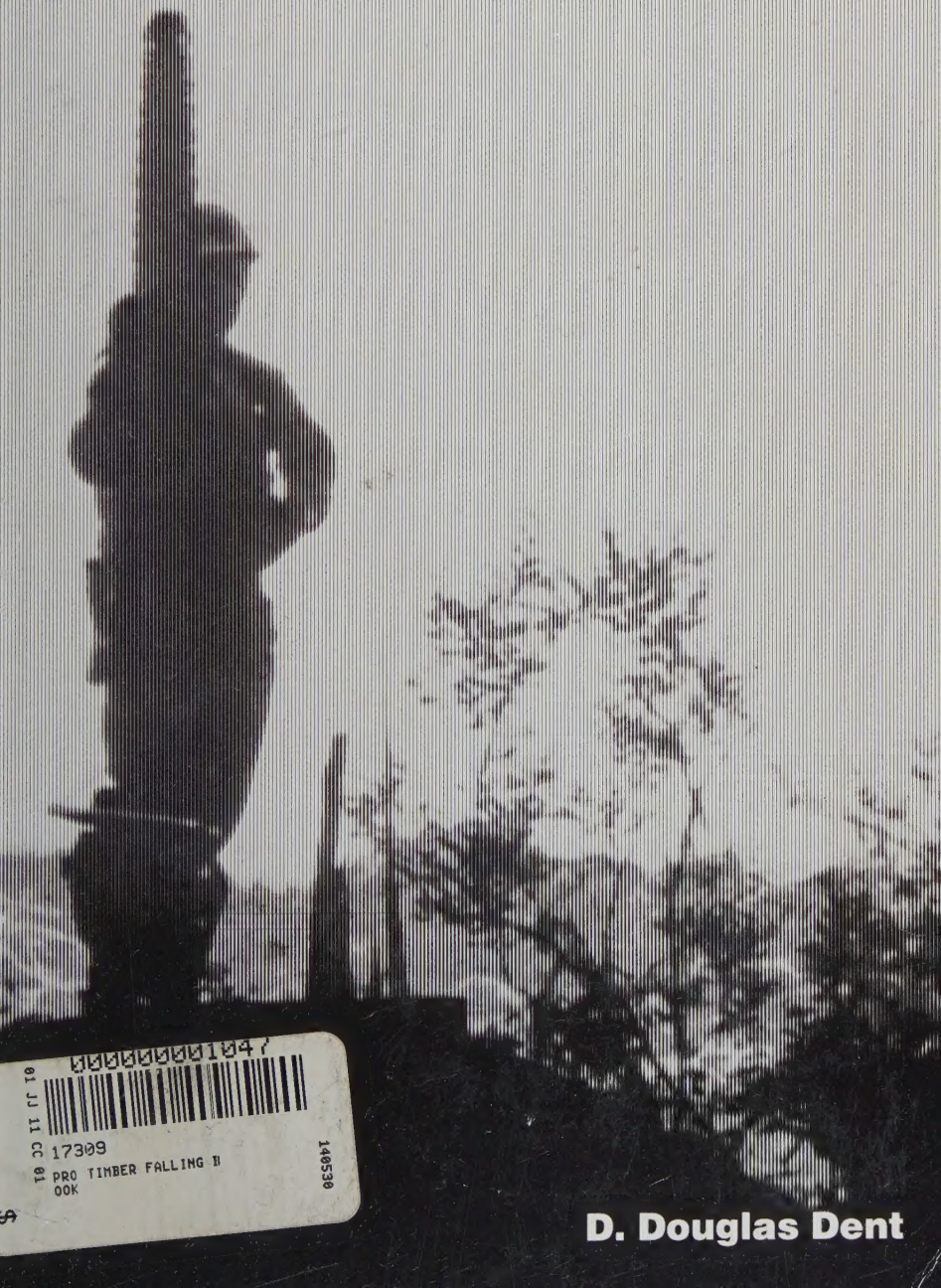
PROFESSIONAL TIMBER FALLING

A Procedural Approach



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D. Douglas Dent

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Professional Timber Falling: A Procedural Approach

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PROFESSIONAL TIMBER FALLING

A Procedural Approach

In memory of my loving wife, Jeannie

D.DouglasDent

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PREFACE

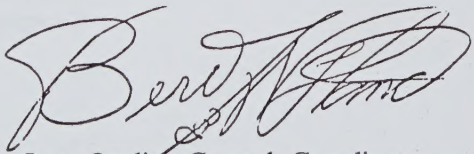
Doug Dent is eminently qualified to write this book. He knows the fine arts of cutting timber, he has been there with saw in hand and has a handle on the many techniques involved in timber cutting.

It is good that he has shared his experience and research which is a great contribution to the timber industry in that it will help many people to better understand the complex techniques involved in quality felling and bucking a tree safely.

If people involved in the manufacturing of logs would follow the procedures and techniques explained in this book, there would not only be less accidents, we would also utilize more wood from each harvest area.

Once the Faller and Bucker lay the saw to a tree, it is like Humpty Dumpty, all the Foresters in the Northwest can't put it back together again, and therein lies the need to do it right the first and only time around.

Millions of dollars and many millions of cubic feet of wood fiber are lost in the felling and bucking of trees each month in the Pacific Northwest. If this book will be used by people in positions to use it along with a good training program for fallers and buckers, the industry can come closer to maximizing the volume and value of a fantastically great renewable resource that will be needed and used even more in the future.



Log Quality Control Coordinator
Northwest Timber Division
Crown Zellerbach

"Experience is the greatest of teachers, but its teachings are often harsh, and sometimes tragic. Those of us who are able to profit by the experience of others can shorten the learning period and avoid the errors that experience has exposed.

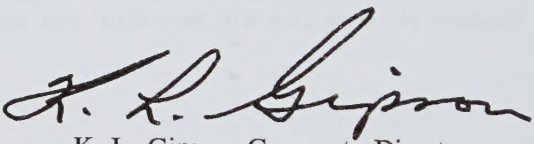
Doug Dent has taken the time to give us a book of valuable lessons taught to him by other men and by his own personal experience. Timber fallers and buckers — old and young alike — can benefit by the plain and simple text on proper techniques.

Beyond those who make timber cutting their profession this book has great appeal. Anyone interested in the forest products industry will find this a valuable addition to their knowledge and library.

Readers of this work will learn what it takes to get the most from our valuable resource, timber, and how to stay alive in the process."

My best wishes to you in your success.

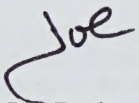
Very truly yours,



K. L. Gipson, Corporate Director
Safety & Workmen's Compensation
Georgia-Pacific Corporation

"Change is the name of safety today, and it could be spelled OSHA. However, laws alone cannot ensure the safety of our fallers. Your systematic approach to the proper execution of each step in the felling procedure provides fallers with an excellent guideline for achieving safety and professionalism. An outstanding book!"

Sincerely,



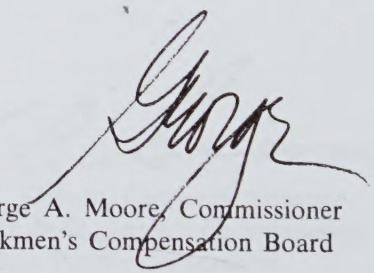
Joe Beckman
Safety Director
Weyerhaeuser Company

When one picks up the fatality statistics in the Pacific Northwest, the first thing that strikes the eye is the plurality of these catastrophies that occur in the logging industry and the shocking report of what happened to the cutters.

Almost immediately upon my appointment as employer representative to the Oregon Workmen's Compensation Board, with particular responsibilities for safety provisions, I started looking for help to better respond to this alarming situation. It wasn't until nearly four years later, Doug Dent arrived at my office and presented his idea for a teaching program for cutters in the woods. Immediately I was intrigued and encouraged its going forward.

Upon reading the text to assist in his course, I am delighted to note his dual concern. He very nicely weaves the safety of the employee with the concerns of efficiency and economy which are so necessary to the industry. I considered it a privilege when I was asked to write this simple endorsement for his work.

Kindest personal regards,



George A. Moore, Commissioner
Workmen's Compensation Board

ACKNOWLEDGMENTS

The resource citations scattered throughout this book represent only a scant reflection of the contributions made, for many people have given to this book, in terms of suggested technique, procedure or organization. Others have contributed encouragement and support. So I would like this work to be viewed as a combined effort by interested people, named and unnamed, who have convictions about safety and professionalism which they feel worthy of submitting.

The author wishes to express special appreciation to the following:

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Barclay Logging Company

Warren E. Dent
Timber Faller
Emerson Logging Company

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Crown Zellerbach

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Crown Zellerbach

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Safety Coordinator, Timberlands (Retired)
Weyerhaeuser Company

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Timber Faller
Emerson Logging Company

Robert W. O'Conner
Personnel and Safety Supervisor
Northwest Timber Division
Crown Zellerbach

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Timber Faller
Crown Zellerbach

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Central Oregon Community College

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Jeannie A. Dent
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Susan C. Nissen, Illustrations 3, 6, 11, 14, 15, 17, 28, 30

Pictures:

Rollie (Rusty) L. Hampton
Courtesy of Crown Zellerbach

Cover:

Vickie K. Nissen

FOREWARD

Basically, the purpose of this book is to assist the novice timber faller, as well as those experienced in the field, in his efforts to safely fall and buck while at the same time utilize as much of the tree as possible. To accomplish this goal, I began with three major assumptions. The first contains the idea that the technique involved in falling and bucking a tree and the safety measures used are not separate entities in themselves, but one combined effort. Embedded in this concept is the belief that safety is merely an application of conscientious falling technique used by the faller to insure his personal well-being. Perhaps a major contributor to ineffective safety planning and programs on all levels is a result, at least in part, of the belief that accidents and deaths can be reduced solely by the implementation of safety procedures. In reality it is the combined application of proper technique and safety measures that can reduce accidents. Proper safety planning is rendered ineffective, if not totally useless, if the correct techniques of falling and bucking are not also applied. Conversely, if the proper techniques are used, but poor safety measures employed, the effectiveness of the correct technique is outweighed. The excellence of one cannot compensate for the laxness or absence of the other. It is the combined effort of both technique and safety that insures the well-being of the worker.

The second assumption considers the falling and bucking of a tree as a step-by-step process. As such, the activities at any step of the procedure can be identified, isolated and analyzed. The value of such an approach is that instead of being concerned with **all** the variables of technique and sources of danger of the process as a whole, each facet can be considered individually. By being broken into smaller units, this book provides the faller with a guideline of what must be given primary consideration at any particular step. It also provides him with a checklist of activities which acts as an indicator of whether an essential step has been omitted. Virtually all accidents occurring from falling and bucking are a consequence of, whether intentional or not, leaving out one or more steps in a particular process or the procedure as a whole. For example, snags should be removed prior to working in the area because they may fall at any time. The faller may, for various reasons, decide to fall one more tree before removing a snag. In so doing, he has left out an essential step and may suffer for his breach in procedure. Or perhaps he forgot this step. For whatever reason, the possibility of injury remains. To deal with this problem, the text has been arranged in a manner in which a sequence of activities leads through the total working procedure. This, in turn, provides the faller with a guideline and checklist of activities he can use daily.

The final assumption of this effort is that the process of falling and bucking is a "subtractive" process which begins with the falling of a tree and ends, for the purpose of this study, with its being sawn into logs. This being so, I have attempted to emphasize each step in the process which may avoid "subtracting" the quantity and/or quality of

the tree. Initially it is the technique used at the stump that determines the amount or degree the tree will be "subtracted". Therefore, emphasis has been placed on the proper technique that must be used, where, and why. The second major source which may "subtract" the tree is bucking. If the correct technique has been used to fall a tree, "subtraction" will be minimal. But, at this point the technique and understanding of bucking becomes imperative, for improper bucking can significantly "subtract" the quantity and/or quality of the tree.

Until recently, the total value of a tree was not viewed as it stood, but rather by the "subtracted" mass that remained once felled and bucked. Currently the disparity between standing and retrievable mass has been given serious consideration. A major portion of this study therefore involves the proper technique applicable to each major source in the total procedure which may avoid reducing the product.

In attempting to accomplish these goals, I have enlisted the knowledge, experience and critical evaluation of timber fallers, supervisors, and other interested persons. Every situation which the faller might possibly encounter cannot be included, because of the multitude of constantly changing variables involved. However, as many as possible have been included. It's not the intention of the author to imply to any reader that reading this book will make him an expert timber faller. The design, however, provides a basic procedural understanding of the physical laws which govern falling and bucking, of safety measures, and of ways to maximize production. Therefore, it is suggested that this book, in conjunction with formalized on-the-job practice, be used as a training manual.

I invite and encourage your responses, not to the intent of this book, but to the suggested techniques and procedures. All of us have something to contribute. If you would like to respond, you may do so by writing to:

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LEGEND

FACE

PRE BACKCUTTING

PRE BACKCUTTING

HOLDING WOOD

CORNER NIPPING

FINAL BACKCUT

ROT

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CHAPTER I

SAFETY EQUIPMENT

The faller is forced, by the nature of his job, to work in a hostile and hazardous environment. Consequently, he must protect himself by using whatever means are neccesary to secure his safety. But means of achieving safety while working are many. Perhaps the most important means are the clothing and protective equipment the faller uses, his knowledge and use of proper falling and bucking technique, the ability of the faller to recognize potentially dangerous situations, and what procedures should be followed for their solution. Of the means of safety mentioned, only the first will be given consideration here. The remaining two will be discussed later in the falling and bucking chapters.

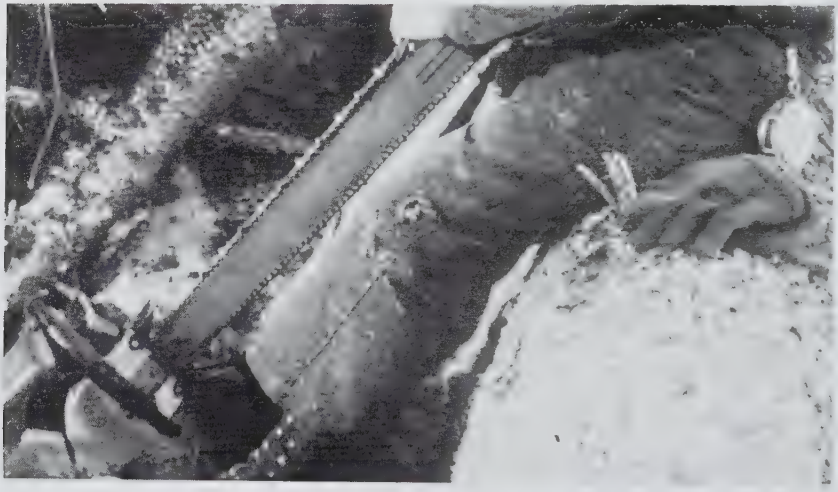
As stated, one of the means through which the faller attempts to secure his safety, is by his use of personal equipment. (Refer to Illustration 1). This personal equipment includes stagged or bobbed off pants. Stagged pants are cut off 3 to 5 inches above the ankle. The purpose of cutting them is to prevent them from hanging up when the faller is working or attempting to escape. Removal of the hem allows the pant leg to be easily torn if it hangs up on debris. Stagged pants should also be loose-fitting to allow the faller freedom of movement. Another part of the faller's safety equipment is his suspenders. Suspenders help support the weight of the saw, especially since most of the saw's weight is carried on one side of the body while working. A recent addition to the faller's personal safety equipment is the leg protector. It is made of lightweight ballistic nylon, and is easily attached to the pant leg. This leg protector has proven to be effective in reducing saw cuts to

ILLUSTRATION 1

TOTAL SAFETY EQUIPMENT — Small and large saw, springboard, bar wrench, hard hat, calks, gloves, single-bitted axe, tape, wedges, suspenders, safety glasses, gas and oil containers, hydraulic jack, jack pad, jack handle.

the leg. (Refer to Illustration 2.) Fallers wear hard hats to protect themselves from overhead hazards. The hard hat is lined with a cloth webbing, which acts as a shock absorber. If a limb should hit the hard

ILLUSTRATION 2



BALLISTIC LEG PROTECTOR — Nylon leg protector worn under pant leg.

Pant leg shows tears from contact with the chain. No injuries received because nylon leg protector was worn.

Calks.

hat it will glance off while at the same time the cloth liner will absorb most of the concussion. Calk boots provide the faller with another safety value. Calks are heavy leather boots containing numerous steel calks or spikes. They promote secure footing for normal falling, bucking or escaping. Ear plugs play an important part in that they screen out harmful noises from the chain saw, thereby protecting the nonreplaceable hearing. The eye protector or face shield provides protection of the eyes. A shoulder pad is used by the faller to protect his clothing and skin from contact with the bar and chain while carrying the saw on his shoulder. Generally, the pad is made of leather or felt. It is kept on the shoulder by the insertion of two slits and then threading it through one side of the suspenders. Gloves are another part of the faller's protective equipment. As in many jobs, they protect the faller from various dangers.

A single-bitted axe and wedges are other essential safety tools. They assist in directing the tree when it is being felled, prevent a tree that is sitting back from going over backwards, prevent the bar from being hung-up while falling or bucking, and they have a variety of pounding and chopping functions.

An axe should have a good square pounding surface. The handle should be free of splits and splinters and the head should be properly hung and pinned. Special safety tools the faller occasionally uses are a hydraulic jack and a spring board. They should be available if the faller needs them to solve a particular problem. It is virtually impossible to lift a large tree that is sitting back by the use of wedges and an axe. Therefore, the availability of a hydraulic jack is essential. The spring board is another piece of equipment the faller finds a need for. Extremely steep ground or trees with a large, swelled butt many times require the use of a spring board.

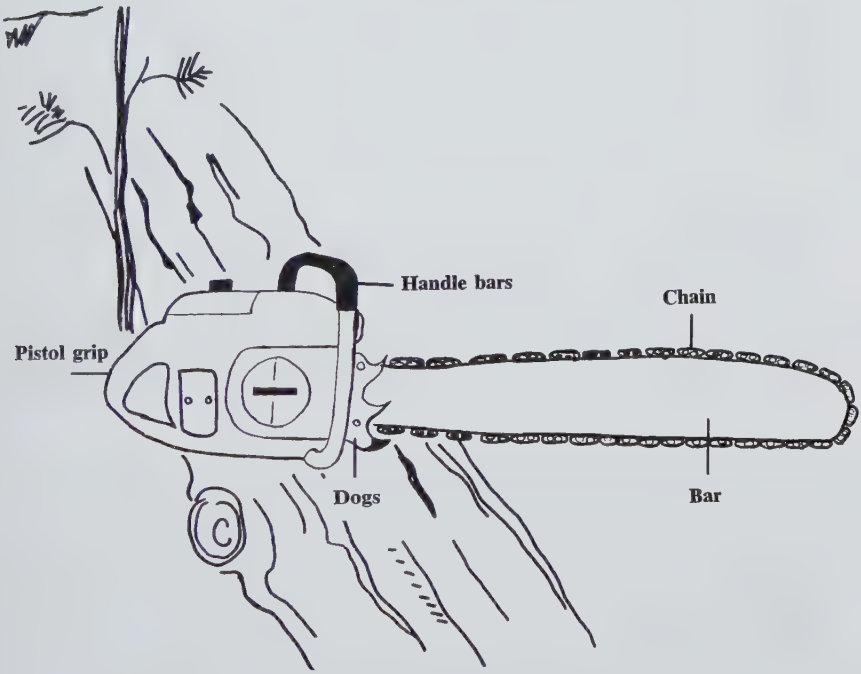
As you see, the faller has many parts to his personal safety equipment. Each part has a specific function and each contributes to the faller's attempt to secure his safety. A professional faller would not attempt to face the hazards of his job without them.

CHAPTER II

THE CHAIN SAW

The chain saw is a mechanical device that the faller considers his primary tool. Basically, it is comprised of a motor, a bar, and a chain. (Refer to Illustration 3). Chain saw manufacturers are producing many

ILLUSTRATION 3
CHAIN SAW



types, shapes and sizes of saws. They are constantly improving the already powerful engines by producing saws that develop more horsepower, thereby giving you faster chain speed per minute. Unfortunately, they have yet to devise a hazardous-free saw that is suitable to the faller's requirements. Needless to say, with a razor sharp chain turning several thousand times a minute, it would take the wink of an eye to sever the user's wrist, arm or leg. Each year, saw cuts are the leading cause of injuries. My premise is that, until a reasonably safe saw can be produced, the faller must adapt himself to use the present saw in a safe and proper manner. The saw can be an efficient, safe tool or it can be treacherous and non-productive. The faller is the controlling factor. The chain saw can only respond to the faller's commands. The above facts, plus the knowledge of numerous saw cuts, initiates the following chapter on the faller's primary tool, the chain saw.

WEIGHT OF A SAW

First of all, the selection of a saw by weight is important. Too many times a chain saw is selected merely because it is the most powerful, without regard to how heavy it is. Being able to hold up a saw in the saw shop does not necessarily mean you can effectively and safely use it all day. Although not substantiated, it is strongly suggested that many saw injuries result from a saw's weight. For example, the faller, tiring from his strenuous duties, may "rest" his saw in his falling or bucking cuts. This situation very likely will result in his being saw cut because he relaxes his grip and is therefore not prepared when the saw kicks back. Much the same situation exists while limbing. If your employer provides you with a saw, be sure you can handle it. If problems arise, discuss them with your supervisor. If you provide your own saw, give special consideration to its weight before you buy it. Selection of a chain saw that can be used safely and effectively **all** day is important.

STARTING THE SAW

The manner in which the saw is started contributes to the degree of control the faller will have over it. The saw should be started while positioned as shown in Illustration 4. Starting the saw while holding it on the thigh of one leg is a sure way to get cut.

Although slight differences may exist between the types of saws

ILLUSTRATION 4

POSITION OF THE SAW WHILE STARTING — The saw is sitting on a stump with the bar overhanging. Notice the bar is not touching any materials which could cause a kick-back. The right hand is firmly gripping the pistol grip and the left quickly jerking the starter rope.

In this starting position the bar is resting on a log. This is a safe starting position if enough bar is extended over the log as shown. Notice the hands are in the same position as in the prior illustration.

being used, the starting procedure is basically the same. Position the saw as shown, making certain that the end or nose of the bar is not touching anything. Turn or push the ignition switch into the "on" position. Next, pull the manual carburetor choke out. Most of the saws used in the logging business are equipped with compression releases to facilitate easier starting. Therefore, push in the compression release. Many fallers injure their starting arm because they fail or forget to take advantage of the compression release. Injury results from failure of the starter rope to pull out with a normal quick jerk, or the starter rope pulling out and the saw either partially starting or backfiring. In the first case, the quick jerk is met with no response of the starter rope. Partially starting or backfiring result in the arm that is pulling back being opposed by a rapidly forward moving starting rope. In any case, the compression release should always be used. After the compression release is engaged, pull out the manual carburetor choke. The next step is to quickly jerk the starter rope. After a pull or two, the saw will attempt to start. At his point, push the manual carburetor choke in. The saw will now generally start. Remember, the safety problems involved in starting a saw are positioning the saw and use of the compression release.

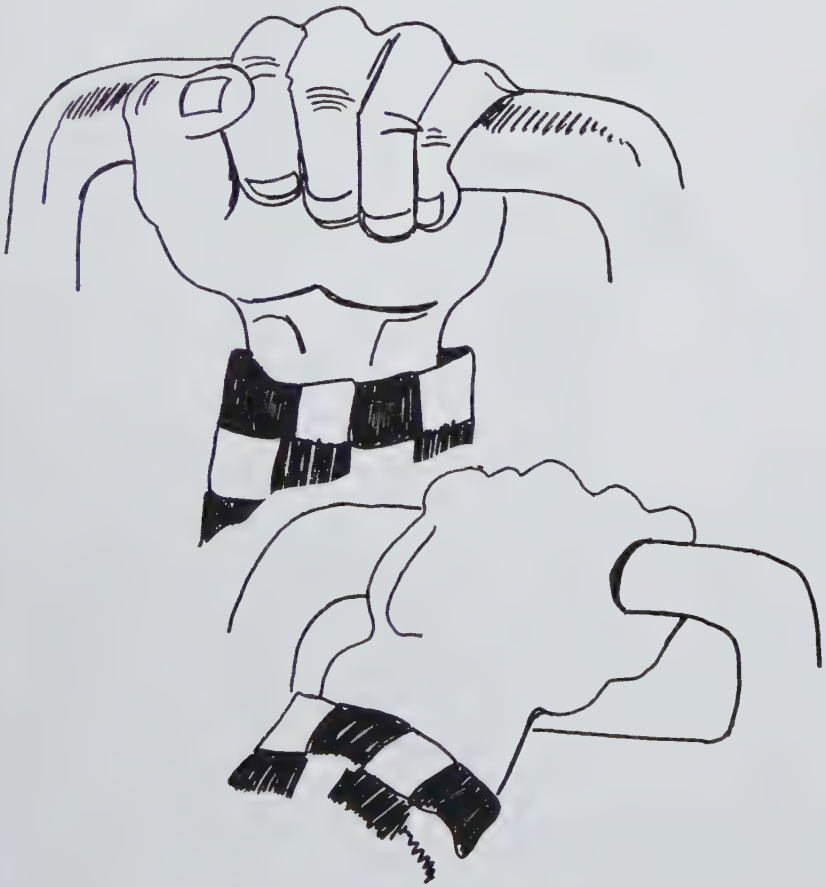
HOLDING THE SAW

Another factor, essential for the control of the saw, is the manner in which it is held by the faller. The saw is held by both hands. (Refer to Illustration 5). The right hand is placed on the pistol grip and the left on the handle bars. Movements to achieve general position and direction of the chain saw, as well as distance of the bar, are responsibilities shared by both hands. Although both hands are involved in

ILLUSTRATION 5
HOLDING THE SAW

holding the saw, the major responsibility rests on the left hand to avoid loss of control. Generally, the most common mistake here is not wrapping the thumb around the handle bar. (Refer to Illustration 6).

ILLUSTRATION 6
PROPER GRIPPING OF THE CHAIN SAW



The correct placement of the hand is with the four fingers hooked over the handle bar with the tips pointing back toward the operator. The thumb should be placed under the handle bar with the thumb pointing away from the operator. The natural opposability of the fingers and thumb around the handle bar should be used at all times. Again, the most common loss of control results from not gripping the handle bar properly. To maintain control, keep the fingers and thumb around the handle bar. Other essential ingredients for maintaining control of the saw are avoidance of awkward cutting positions, and proper use of the bar. These topics are discussed in detail in the chapter on bucking.

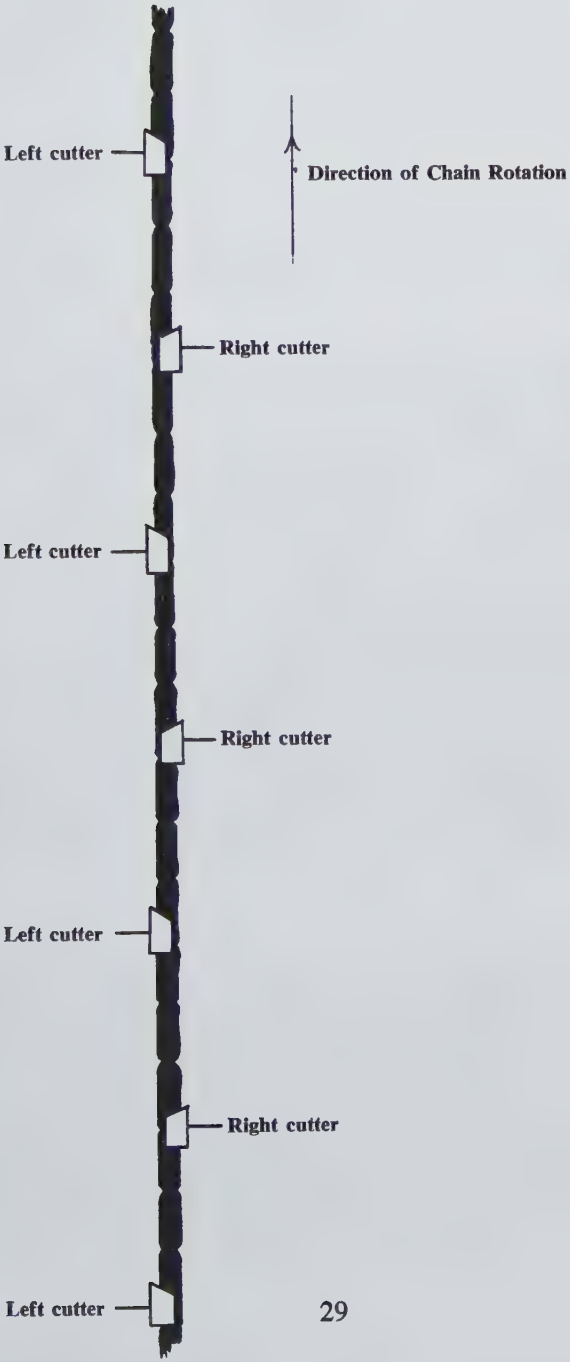
IMPROPER GRIPPING OF THE CHAIN SAW

FILING THE CHAIN

Selection of the type of chain to be used is also an important decision. Like chain saws, there are numerous types and manufacturers of chain. To a large extent, control of the chain saw depends on the type of chain being used as well as in what manner it is being filed. Investigators are now looking into the question of which chain, if any, is superior in terms of performance and safety. Until results are received, no particular manufacturer or type of chain is preferrable. But filing the chain is another matter. The manner in which chains are filed has a direct effect on control of the saw. A saw chain is comprised of two cutting sides. (Refer to Illustration 7). The two rows of teeth on a chain have two basic relationships to each other: one, that all of the teeth on one side be filed the same in regard to angle of the tooth, its depth and the height of the rider. Two, that the two rows of teeth, one on each side of the chain, be filed in a manner in which their combined cutting produces smooth, accurate, and safe cutting.

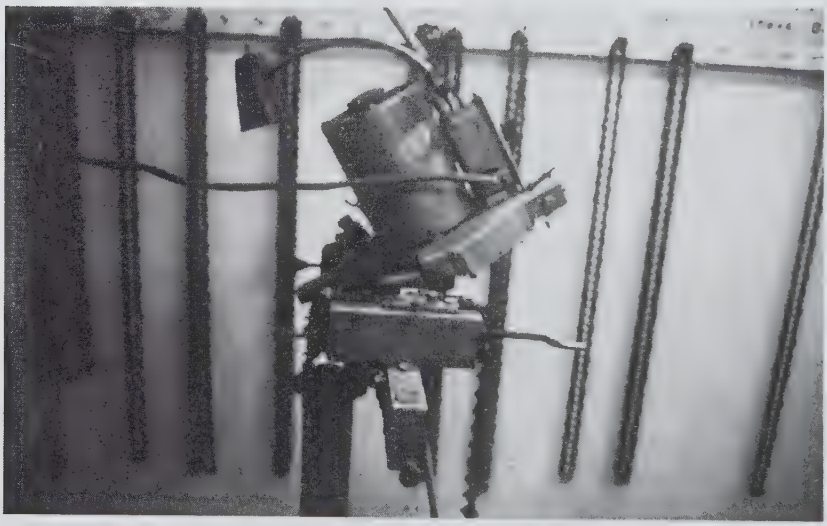
An improperly filed chain presents the faller with several problems. Some of the imperfections of filing are these: 1) all of the teeth on one or both sides of the chain are not being filed the same, 2) one side of the chain is being filed better than the other. 3) all of the riders on one or both sides of the chain are not filed at the same height. Any one or combination of these poor chain relationships results in individual teeth and individual sides cutting varying depths and angles. This difference in cutting promotes vibration, kickbacks, inaccurate sawing

ILLUSTRATION 7
TWO CUTTING SIDES OF A CHAIN

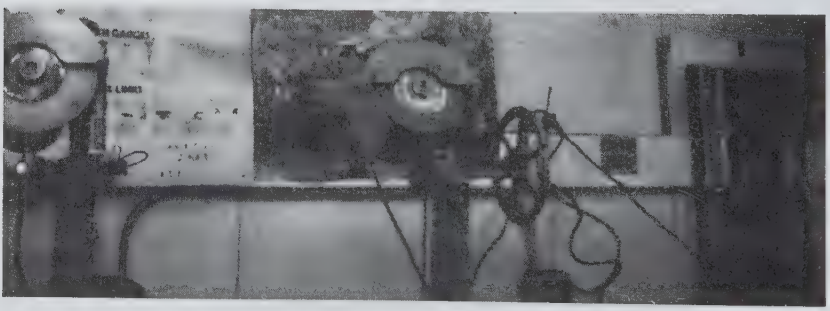


and faller fatigue. These are only three examples of improper filing and their resulting effects. Many more could be stated. A chain is one part of a high-performance machine. The manner in which it is filed determines how it will contribute to the overall efficiency and safety of the saw. Regardless of the type of chain being used, every effort should be made to insure correct filing. Traditionally fallers have filed their own chain. A faller once stated that it takes several years to learn how a chain should be filed and another several years attempting to do it. It is virtually impossible to hand file a chain so that all of the teeth on both sides are filed exactly the same. Realizing this, many fallers and falling companies have either secured or experimented with automatic chain grinders. (Refer to Illustration 8). Such a machine can file

ILLUSTRATION 8



A. AUTOMATIC CHAIN GRINDER



B. AUTOMATIC RIDER GRINDER

all the teeth on both sides of the chain exactly the same. It is suggested that chains be filed by such a machine if possible. Everyone benefits from precision-filed chains. Accurate and straight cuts, safety, and production are at stake when your chain is not filed precisely.

KEEPING THE CHAIN SHARP

Once the chain is sharp, the faller should make every effort to keep it that way. It is a good policy to make a sheath of wood or some other material to protect the chain during transportation or storage. Once on the job many situations arise, which if not handled properly, can result in the chain being dulled. Whenever the saw is not being used the bar should be positioned to prevent the chain from coming in contact with dirt, rocks, metal or other objects.

During the falling procedure, the chain becomes dulled as a result of dirt mixed with the bark in the facing and backcutting area and/or dirt and rocks on the offside. To prevent the dulling of the chain in either of these situations, the following suggestions may be helpful. First, the offside should be checked to determine whether any of the falling cuts will result in the chain coming in contact with any of the sources of dulling mentioned. If such a source is present, the falling cuts may be adjusted to compensate for it or the source can be removed. For example, if dirt and rocks are in the facing and backcutting area, these cuts can be made further up the tree to avoid them. Moving the falling cuts up the tree eliminates the problem of dulling the chain but creates the problem of improper utilization of the tree. In this case the largest portion of the tree is being wasted. The second approach is to remove the source of dulling. However, after removal of dirt, rocks and other debris, it may be necessary, using an axe, to chop away the bark which contains dirt and possibly fragments of rock. By following this second approach, the faller can maintain the sharpness of his chain while at the same time utilize the tree as much as possible.

While bucking the faller must also contend with the same sources of dulling. If the area to be bucked has dirt or rocks around it, the faller has the same options available as he does while falling; change the location of the cut or remove the source which results in the dulling of the chain. In this instance, the adjustment of the bucking location may be done but the faller must keep in mind that his responsibility is to maximize utilization of the product. By decreasing the length of a log to avoid contact with dirt or rocks you may also drastically reduce the value of the log. Therefore, adjustment of log lengths to avoid a source that may dull the chain must be done responsibly. The second option open to the faller is to remove the dirt and rocks. As in falling, it may be necessary to chop a ring of bark off the tree where the cut is to be made. Of the two methods of protecting the chain while bucking, the one preferred depends on the situation. However, keep in mind that

the faller's first consideration must be in favor of maximizing the product rather than maintaining the sharpness of his chain.

Another source of dulling the chain while bucking involves the use of the bar. Many times a chain is dulled not because dirt and rocks are around the bucking location, but because the bar is allowed to cut into the ground. The correct distance of a cut is something that only experience will establish. However, the observant cutter can reduce the possibility of "overextending" his cut by following a simple bucking technique. As a bucking cut approaches completion, the wood chips resulting from cutting will change in color from the tissue wood to that of the bark. Therefore, when the cut is nearing completion, close observation of a change of color in the chips will be a warning to the cutter that the bark on the bottom of the tree is being sawn in two. This application of technique will, as will the others mentioned, enable the faller to help maintain the sharpness of his chain.

CHAIN ADJUSTING

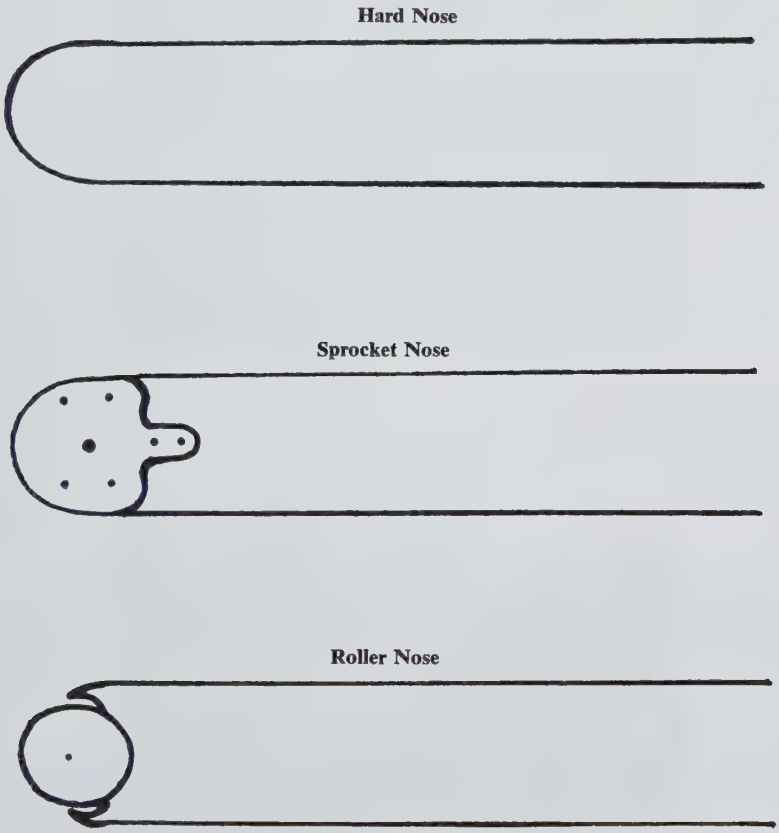
If the chain is not properly adjusted, or if it is allowed to run with improper tension, several problems arise. The overly tight or loose chain results in excessive wear of the bar, motor and chain. An improperly tensioned chain results from the faller's failure to adjust it or his failure to recognize its proper tension. Another contributor to improper chain tension is having an inadequate, plugged or defective automatic chain oiler.

The overly-tightened chain will stretch after a period of time, requiring a link to be taken out of it. Also, much strain is put on the chain tightener screw with the possibility of eventually breaking it. Besides causing excessive drag on the motor, the overly-tight chain wears out both bar and chain.

A loose chain eventually picks up enough slack to be thrown off the bar. The results are possible cuts from the chain as it comes off, destruction to the chain teeth that come in contact with the handle bar, and the weakening and the possibility of eventually severing the handle bar at the bottom of the saw from being repeatedly struck by the flying chain. Besides the obvious wear on a chain in this situation, a loose chain does not get the benefit of being guided by the bar, and the cuts run off at an angle.

Although slight differences exist between how the chain is adjusted from one saw to another, basically the same principle applies. The type of saw doesn't really affect the procedure of adjusting the chain tension, but the type of bar being used does. Basically two types of bars are commonly used, those with revolving tips and those with stationary tips. (Refer to Illustration 9). Of those that revolve, two are basic: the sprocket nose and the roller nose. In both of these types the friction of the chain revolving around the bar is greatly reduced because the end of the bar turns as does the chain. Friction is reduced even more because the turning end of the bar can be greased by the use of a small grease

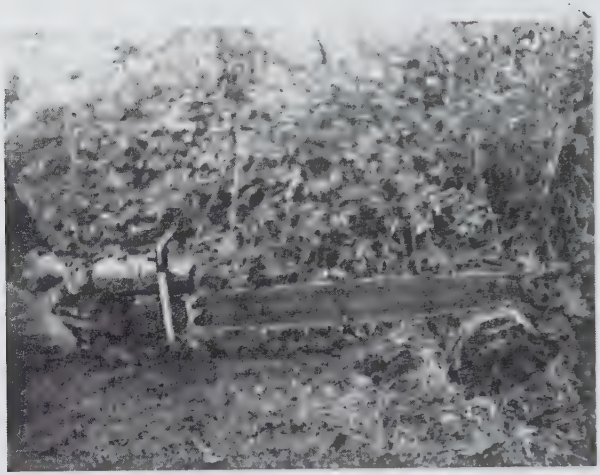
ILLUSTRATION 9
THREE MAJOR TYPES OF BARS



gun. The chain adjusting procedure suggested below should be used when the bar involved is either a roller nose or a sprocket nose.

Place the saw as shown and loosen the bar nuts, but do not remove them. (Refer to Illustration 10). Place the left hand on the pistol grip and lift to transfer the saw's weight to the end of the bar. This is done because the pressure on the bar is downward whether you are falling or bucking. To allow the bar to continue downward while falling or bucking, the pistol grip is lifted and the dogs act as a pivot point. As shown, the pressure is upward on the pistol grip and downward on the bar. After the bar nuts have been loosened, turn the chain or bar adjusting screw

ILLUSTRATION 10
CHAIN ADJUSTING



1. Shut the saw off.
2. Loosen the bar nuts.
3. Position the saw as shown (with the end of the bar on the log).
4. With the left hand lift up on the pistol grip.

5. Insert a screw driver and tighten the bar adjusting screw.
6. Retighten the bar nuts.
7. Start the saw to allow the bar and chain to seat.
8. If necessary repeat the procedure.

with a screwdriver. Turn clockwise until the chain fits snugly into the bar groove. Now tighten the bar nuts. Making sure the end of the bar is not touching anything, start the saw and allow the chain to revolve

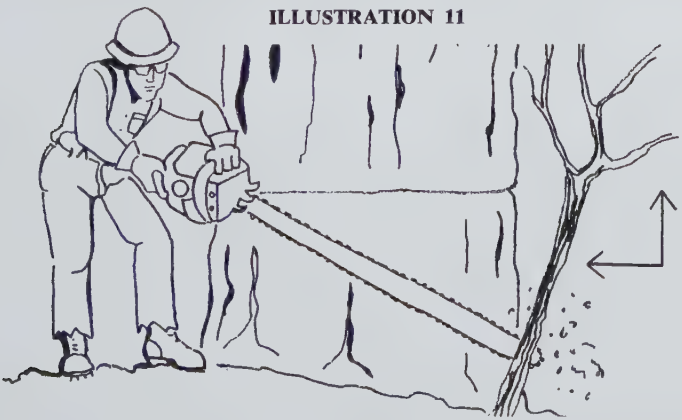
around the bar. Stop the saw and recheck the tension of the chain. If it has loosened, follow the procedure again. The purpose of running the saw is to allow the chain, bar, and adjusting screws to seat themselves.

When a hard nose or stationary tipped bar is used, the procedure of tensioning the chain is the same as with revolving ones. The only difference is that the chain on the hard tipped bar is not tensioned nearly as tight around the bar. Since the end of the bar is stationary, substantially more friction results. If the chain is adjusted tightly, it causes both the bar and chain to become extremely hot as it revolves around the bar. In the process, the chain stretches and excessive wear results on the chain, bar, and motor. Therefore the chain tension on a hard-tipped bar must be less to allow more slack than that required on a revolving-tipped one. The amount of tension that should be used on a hard-tipped bar is difficult to suggest. The difficulty arises from such variables as length of the bar, species of tree being cut, whether the tree is dead or alive, size of trees involved, adequacy of the automatic chain oiler, and type of chain oil being used. Of the two types of bars mentioned, those containing revolving tips are recommended. Mechanically, they are superior to hard-tips in several ways. First, the revolving-tip greatly reduces the friction of all the parts involved. Secondly, the ability to grease the tip of the bar, enables the chain and bar to be greased at both ends. Thirdly, the chain can be tensioned tightly, making chain-throwing occur less often than it does with a hard-tip. All of these mechanical advantages promote less wear on the saw as a whole.

USE OF THE BAR

Correct use of the bar is essential for the proper control of the chain saw. Both the top and bottom of the bar can be effectively used in cutting. Problems arise when the extreme upper or lower portion of the bar's nose is used improperly. (Refer to Illustration 11). These portions

ILLUSTRATION 11



SENSITIVE PORTIONS OF THE BAR — The arrows indicate the direction of the kick-back.

of the bar are sensitive. When used improperly, they react by kicking back. If the bottom end of the bar comes in contact with an object it kicks back and up. Contact with the top end of the bar reacts by kicking back and down. Even though the reactions are quick and hard to control, they can be anticipated. If the possibility exists that objects lying beyond the area being cut may come in contact with the nose of the bar, they should be removed. This subject is discussed in more detail in Chapter IX.

SAW CUTS

Although saw cuts have been mentioned several times, perhaps resulting damages should be mentioned. A cut resulting from contact with the saw chain is not similar to the narrow, clean cut of a knife or some other sharp instrument. The cut from a knife is a narrow separation of tissue which generally mends easily and quickly. A cut from a saw chain is another matter. The severity of damage resulting from a saw cut primarily arises from the combined cutting of both sides of the chain at once. Instead of the cut being narrow and clean as with a knife, the chain cut is the width of the kerf of the chain. The saw cut is not a separation of tissue as much as it is a tearing out of tissue. As suggested, the parts of the body most frequently involved in being saw cut are the extremities. Flesh and bone are commonly torn and ripped. In extreme cases, dismemberment and/or permanent disabilities have been the drastic consequences of saw cuts.

MAINTENANCE

Regular maintenance is another factor which reduces the possibility of losing control of the chain saw. Regardless of the type or manufacture, all chain saws need continuous repair. Neglecting to service and care for the saw not only reduces its performance but contributes to control loss. For example, performance is reduced if defective plugs and points are used, or if they have not been gapped properly. Saw efficiency is adversely affected in a similar manner if the fuel filter and air filter are defective or not cleaned and inspected regularly. Any one of these important maintenance areas can reduce a saw's efficiency. Poor performance also leads to potential danger for the faller. After properly facing a tree, the faller begins the backcut or final cut required to fall a tree. Any one, or any combination of the above-mentioned saw defects, could result in losing control of the tree and/or its barber-chairing. (Refer to Illustration 12). In this particular instance, the tree barber-chairs because it begins to fall but is held by the holding wood. A defective saw, running poorly, may sputter and partially die. The faller therefore cannot finish cutting up the holding wood. The result is that the tree,

ILLUSTRATION 12

BARBER-CHAIR — A poorly running saw may result in a barber-chair.

now leaning heavily, splits vertically up the butt and large splinters are shot in a myriad of directions. This loss of control precipitates many safety and utilization problems. An uncontrolled tree may hang up, fall into other standing timber, or create a number of equally dangerous situations. No matter which occurs, the faller is forced into an extremely dangerous curative measure in attempting to continue his work. Another result of this situation is loss of merchantable lumber. The split of the tree may ruin hundreds and perhaps thousands of dollars worth of lumber. Each year untold dollars in marketable timber are lost in similar ways. It is the responsibility of the faller to work in a manner which is safe and at the same time maximize utilization of the product. These areas will be discussed in depth later under the topic of facing.

Other neglected maintenance areas contributing to loss of chain saw control are among those listed in the following outline.

1. Loose or broken handle bars
   Caused by:
   - A. Loose, stripped or lost bolts
   - B. Broken mounts
   - C. Area below saw being weakened or cut in two by repeated contact with thrown chains

   Result: Chain saw fails to respond to normal physical pressures—various safety hazards result—very dangerous
2. Loose or broken pistol grip
   Caused by:
   - A. Loose, stripped or lost bolts
   - B. Broken mount

   Result: Failure of correct response of saw to normal physical pressure. Also improper control of throttle—very dangerous
3. Broken or defective clutch shoe or clutch spring
   Caused by:
   - A. Inadequate manual oiling of clutch bearing
   - B. Normal wear
   - C. Defective part

   Result: Chain constantly moves around bar, chain will not stop even when idling—very dangerous
4. Leaky gas cap
   Caused by:
   - A. Cross-threaded or loose cap
   - B. Plugged vent
   - C. Over-heated motor
   - D. Defective cap

   Results: Gas and oil mixture leaking onto handle bar resulting in slippery gripping surface, and fire danger

5. Worn out or defective bar
   Caused by:
   - A. Use of improperly gauged chain for bar
   - B. Prying with end of bar
   - C. Loose tip, sprocket or roller
   - D. Clogged or defective chain oiler
   - E. Chain overly tight, or overly loose
   - F. Normal wear

6. Inability to shut saw off
   Caused by:
   - A. Defective shut off switch
   - B. Loose or broken wire

   Results: Saw cannot be shut off. If this occurs, an effective method of shutting the saw off is to pull the choke out

7. Improper carburetor adjusting
   Caused by:
   - A. High speed jet improperly adjusted
   - B. Low speed jet improperly adjusted
   - C. Idler adjustment improperly set
   - D. Bent throttle linkage
   - E. Defective carburetor

   Results: Basically, general inefficiency. Some specific results include excessive wear of internal parts or destruction of motor because high speed jet is too lean; failure of chain to stop when throttle is released because idler is adjusted too high; or failure of saw to idle at all because idler adjustment is too far out. These are a few, others will be discussed later.

CHAPTER III

FALLING PROCEDURE AND SEQUENCE

This chapter deals with the falling of a tree in a procedural and sequential manner. It is intended to give the reader a step-by step approach on how the professional faller does his job. Also considered is the technique he uses, why each specific technique is used, and the safety measures involved.

STRIP LAYOUT

The faller's first consideration is to observe the lay of the land. Seldom does he come across a falling area in which the terrain is flat. Generally, the faller encounters varying land formations from gullies to extremely steep hillsides. These varying land formations must be considered before the faller begins. Strip layout refers to the predetermined sequence in which the trees will be felled, and in what direction or lead. Strip layout is therefore the best method of falling the trees in that area in relation to themselves and the terrain. Many times it is the first few trees felled in an area which determines how the remaining ones are felled. In what manner or direction these trees are felled, determines the degree of breakage and safety problem that will result. Due to the infinite varieties of natural land formations that the faller will encounter, no overall standard for strip layout will be presented. However, a good bet for the faller is to consider the majority of the trees in the falling area in relation to their lean and possibility of lays, especially the larger, more valuable ones. Special attention should be made to insure that their value is not reduced or minimized due to breakage. This does not imply that smaller trees are not valuable, they are. What is being suggested is that, given a choice between saving a small tree or a large tree, the faller's consideration must be in favor of the larger. This is especially true because generally smaller trees are more pliable than are larger ones. Therefore smaller trees can be felled in a position or lay that would break a larger tree.

As suggested, failure to consider the immediate lay of the land, will likely result in excessive breakage and safety problems. Some large companies are just beginning to realize the losses due to breakage and injuries, and have come up with some astounding statistics. Mr. Bert Wyland, Log Quality Control Coordinator of Crown-Zellerbach, has done exhaustive research in this area. He has recorded as much as as 20% of the total utilization of an area as being lost due to breakage. The basic cause of these losses has been attributed to a combination of improper strip layout and poor falling technique. Some examples of good and bad strip layout are shown in Illustration 13. Effective strip layout is as important a part of the fallers responsibility as is falling or bucking. The reality of this statement is evident when it is considered that if the faller has failed to establish a proper strip layout the availability of possible lays becomes increasingly fewer. Generally

ILLUSTRATION 13
POOR STRIP LAYOUT

GOOD STRIP LAYOUT

a point is reached at which no alternative remains to the faller except to fall the tree and hope for the best. Excellent at-the-stump falling technique cannot compensate for inadequate strip layout, for if all or the majority of possible lays for a tree have been eliminated the faller's alternatives are likewise eliminated. Therefore strip layout is the first essential of the total falling sequence.

Mr. Delbert Hansen, a man considered by this author, as well as many others, as an extremely learned faller, suggests that a major problem of inadequate strip layout occurs when the faller encounters draws. To effectively deal with the problems of draws, Mr. Hansen suggests that the draws be filled prior to earnest work in the area. Since draws limit the availability of lays, filling them first increases the possibility of more lays. Once filled, other trees can be felled directly or quartered across the draw without breakage.

Another essential of proper strip layout that must be understood is that strip layout does not mean that once the lead has been established that it cannot be changed. Strip layout refers to the best manner in which the trees can be felled in relation to themselves as well as the terrain. Therefore if the terrain changes, so must the lead, and perhaps the lead must be changed one or more times on the same strip.

Mr. Wyland has introduced another variable of strip layout that is worthy of mentioning. Strips are generally established prior to the fallers beginning work. After looking over the strip the faller may find that the manner in which it has been laid makes it extremely difficult, if not impossible, to successfully fall. Therefore Mr. Wyland suggests that on occasion, after serious consideration, the faller bring the situation to the attention of those responsible. It is the responsibility of the faller to conscientiously consider strip layout not only in regard to utilization of the product but in regard to his personal safety as well. This being so, at times he may bring a particular stripped area to the attention of his supervisor. Then the area, if deemed necessary, can be re-marked to facilitate better strip layout.

CHECKING FOR SNAGS

The faller's attentions are now directed toward safety. While determining the best method of strip layout, the faller also checks for snags in the immediate working area. Snags present a special problem for the faller because they may fall at any time and in any direction. A snag, by definition, is a dead or dying tree which is still standing. To one degree or another a snag is comprised of rotten wood. Many times the supporting root systems have decayed to the point that virtually any vibration will result in the snag toppling to the ground. Vibrations from a falling tree, gusts of wind or decomposition of the roots to an extreme degree will cause a snag to come crashing down. Before earnest work in an area begins, all snags must be felled. (Refer to Illustration 14). An in-depth analysis of snags and their proper removal will be discussed on page 131.

ILLUSTRATION 14
PRESENCE OF SNAGS IN THE WORKING AREA

SWAMPING OUT

In approaching the tree, swampout or clear the brush and debris from around the tree to be felled. Pay particular attention to loose chunks of wood which could, if stepped on, result in the faller losing his balance. Also, clear brush and small trees which could hamper the use of your saw, axe, or wedges. (Refer to illustration 15). As seen,

ILLUSTRATION 15
SWAMPING OUT

the end of the bar is unintentionally touching some brush and a small tree. The saw could kick back and very possibly result in a saw cut.

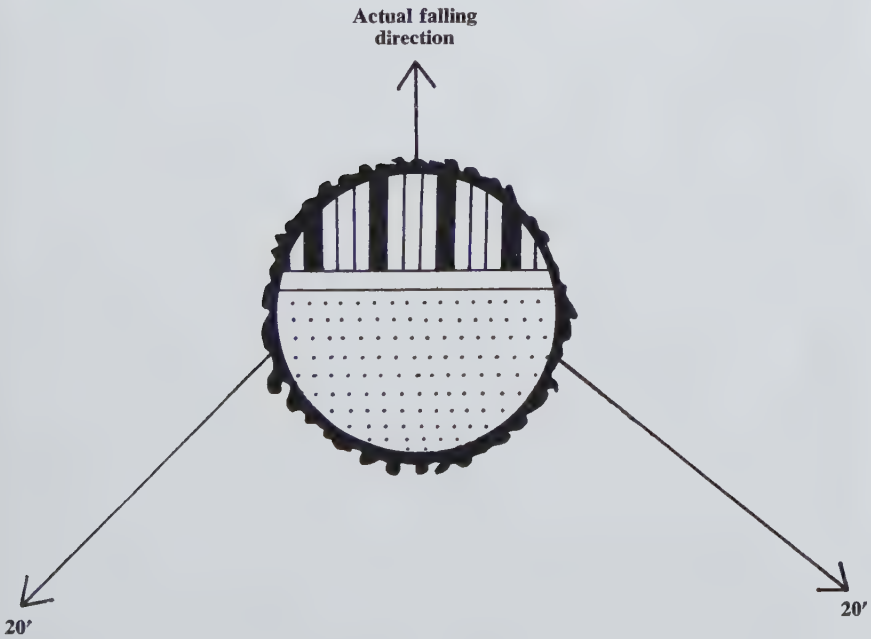
OBSERVING THE TOP

Step back and observe the top of the tree to be felled. See that no other tree, dead or alive, is leaning into it. Also see that no loose limbs are hanging overhead. The procedure of what to do if a tree is leaning into the tree to be felled will be considered later.

ESCAPE ROUTE

Finding the top unobstructed, the next step is to plan an escape route. An escape route is a predetermined path along which the faller proceeds once the tree is committed to fall. Its proper planning and execution enables the faller to eliminate hazards at the stump. The escape route should not be directly opposite the way the tree falls but back to one side. (Refer to Illustration 16). For example, the direction

ILLUSTRATION 16
EFFECTIVE ESCAPE ROUTE PLANNING



of the escape should be back and to the right or left of the tree's intended fall. Don't be lazy, examine your route carefully. The major cause of ineffective escape route planning results from the faller only considering the first few steps of escape and not beyond. The smart faller plans his route of escape from the stump to the actual location where he wants to be when the tree hits the ground. Minimumly, this distance from the stump to the desired escape position should be 20 feet. Needless to say, the further you are from the stump the safer you are, especially if you get behind another tree. For the sake of your safety, plan whatever distance that you deem necessary. Be sure that it is at least 20 feet, however. Many fallers have been killed or seriously injured because they neglected to follow this procedure.

SIZING UP THE TREE

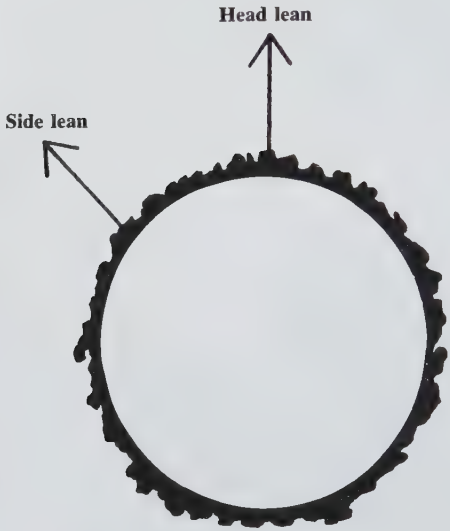
The next step in your falling procedure is to size up the situation. Determine which way the tree leans. Correctly picking the lean is one-half of the job. To understand the importance of correctly determining the tree's lean is to understand that the lean establishes the general direction that it will fall. If a vertical line is placed in the center of the tree's butt and extended to the tree's top, you can determine which way the tree will naturally fall by the amount of the tree extending over the vertical line. The lean of a tree can be established in a similar manner by the use of a plumb-bob, or axe. (Refer to Illustration 17).

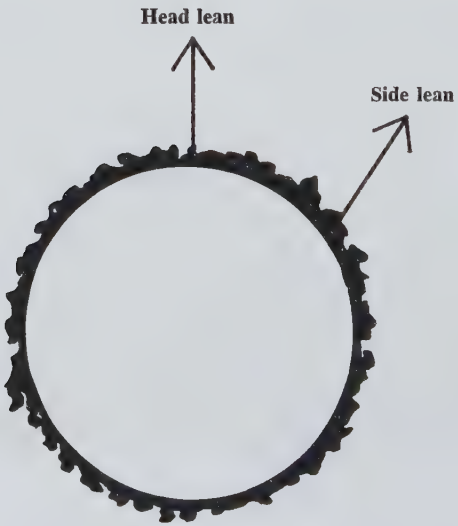
ILLUSTRATION 17
PLUMBING THE LEAN OF A TREE WITH A PLUMB-BOB
Upper left illustration indicates dotted vertical line which establishes the lean.

Upper left photo illustrates plumbing the lean of a tree with the use of an axe.

Generally the faller must determine two major leaning forces in play in most trees. These two lean forces are referred to as head lean and side lean. Both of these lean forces must be given consideration if the tree to be felled is to fall where intended. (Refer to Illustration 18).

ILLUSTRATION 18
DIRECTIONAL FORCES OF HEAD LEAN AND SIDE LEAN

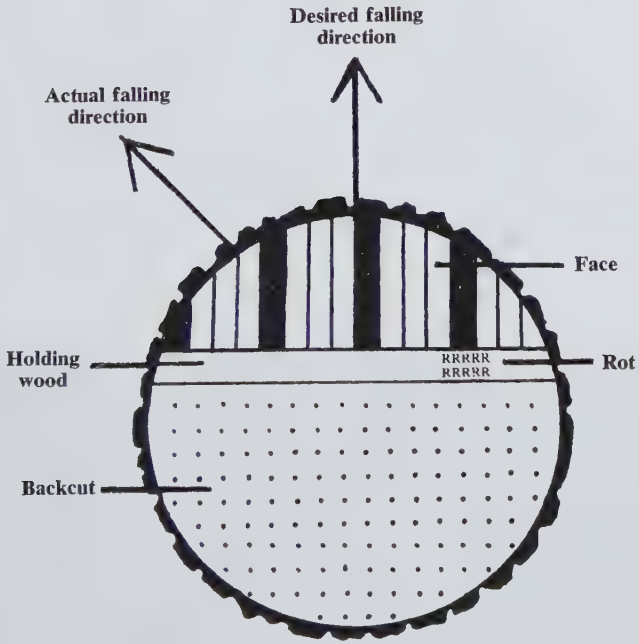


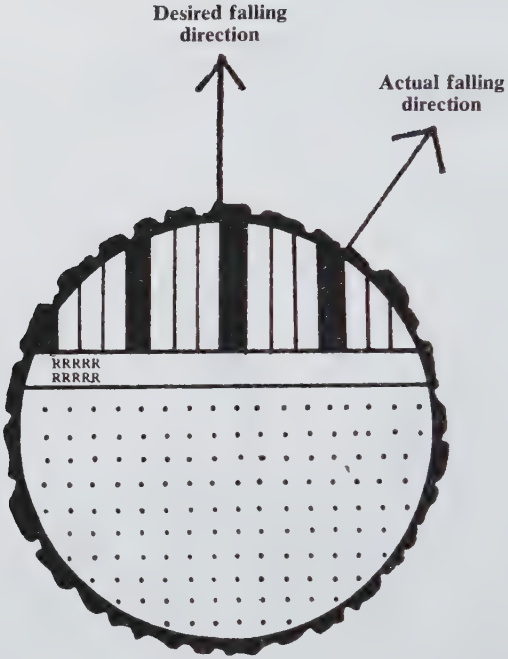


Another important part of sizing up a tree is determining the soundness of its base. Hidden stump rot, cat-faces or other abnormalities must be determined before the actual falling procedure begins. The importance of evaluating such irregularities is that they can, especially if in the holding wood area, result in loss of control of the tree. (Refer to Illustration 19). Also involved is the possibility that

ILLUSTRATION 19

EFFECT OF ROT IN THE HOLDING WOOD AREA — The presence of rot in the holding wood area can be paralleled to the cutting off of the holding wood on one side.





these irregularities, if severe, can cause the tree to fall during the facing procedure. Therefore the faller should determine the soundness of his tree prior to facing it. Defects can be determined by boring into the tree or sounding it with an axe. Mr. Hansen suggests that perhaps the art of sounding with an axe is being lost. But regardless of the method used, each tree, if hidden defects are suspected, should be tested. Many professional fallers believe and practice the procedure of securing the area before facing a tree. Due to the fact that these hidden defects are constantly present, Mr. Hansen suggests that the safety of those who may be in the area (buckers, scalers, other fallers, etc.) must be given consideration before initiating the facing cuts.

RE-EXAMINE THE ESCAPE ROUTE

Re-examine your route of escape. Now that the strip layout and lean of the tree have been established and consequently where you want the tree to fall, does your escape route still appear the best means of safely getting away? If not, re-examine your situation and prepare another path of escape.

WALK OUT THE LAY

Once the faller has decided on where he wants the tree to fall, he should walk out his intended lay to see that no unseen objects are present. These being old stumps, large rocks, windfalls or uneven terrain which could, if the falling tree hits them, result in a substantial loss of timber due to breakage. It's rather foolish for the faller to go through all the work involved to fall a tree and then allow it to be broken into pieces because he failed to take a few steps to check the lay area out. (Refer to Illustration 20). The professional faller has pride in his work and takes his responsibilities seriously. He does everything possible to save the tree he is falling. At this time, the faller should also determine if any down snags or down small trees, in the immediate stump area, could, if hit by the falling tree, swing around and hit him. If such a hazard is present, the faller should buck them into two pieces to prevent their swinging.

ILLUSTRATION 20

FAILURE TO WALK OUT THE INTENDED LAY

Notice the split in the butt of this large spruce.

This is looking from the butt of the large spruce down the tree. A large stump was hit.

The stump is in the foreground. Notice the white tape measure is pointing to the actual faced direction. The intended lay should have been walkd out prior to falling this tree.

Another result of a hidden stump.

The tape shows that the tree was faced directly over an unobserved stump.

A hidden stump is in the foreground.

Failure to walk out the intended lay.

This faller had walked out the intended lay and then faced his tree. After reconsidering, he cuts off a stump in line with the intended falling direction of the tree.

FACING THE TREE

The next step is to face the tree. Falling a tree requires the timber faller to consider a number of variables, although the actual procedure of falling a tree is completed by the sawing of three cuts. The face requires a horizontal cut and a sloping cut. The third and final cut is the backcut. It is here, at the stump, that the faller determines not only the fate and value of the tree that he is falling, but his personal fate as well. An improperly faced tree will not fall where it was intended to fall, and as a result both the faller and the tree are in jeopardy.

A professional faller always puts his best face forward. He realizes that the face allows the tree to fall freely and it also helps direct where the tree will fall. The face is comparable to the sights on a rifle in that both determine direction. Therefore, the proper use of the face is a key to professional falling.

CONVENTIONAL FACE — HUMBOLDT FACE

Two types of faces are commonly used: the Conventional face and the Humboldt face. In the Conventional face the undercut is taken from the butt of the tree, in the Humboldt, it is taken from the stump. (Refer to Illustration 21). Although both faces perform the same function each has its good and bad points. The Conventional face allows the faller to utilize more of the tree, especially the large butt, than

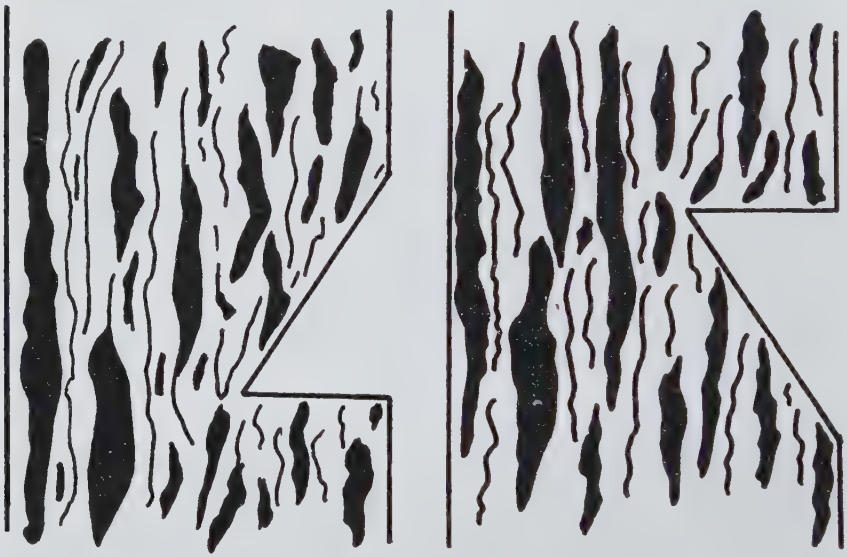
ILLUSTRATION 21

CONVENTIONAL FACE - HUMBOLDT FACE — Two cuts form the face. In the Conventional face the undercut is taken from the butt of the tree, in the Humboldt it is taken from the stump.

does the Humboldt. The reason is that the horizontal cut of the Conventional face is low with the sloping cut above it. The horizontal cut of the Humboldt face, in contrast, must be substantially higher due to the fact that the sloping cut is below it. The necessary clearance required by the bar from the ground therefore necessitates a much higher horizontal cut. (Refer to Illustration 22). The Conventional

ILLUSTRATION 22

HEIGHT DIFFERENCE BETWEEN THE CONVENTIONAL FACE AND THE HUMBOLDT FACE.



face minimizes breakage when falling more than does the Humboldt because much lower stumps are left. This statement is particularly true if the falling area involved is a clear cut or heavily marked select cut. If this statement is disagreed with on the basis that the higher Humboldt stumps left are trimmed prior to falling other trees, then it can validly be stated that the Conventional face is more efficient. In this instance the Conventional face is more efficient because its stumps are quite low to the ground and therefore extra time is not needed to go back and trim them lower before falling other trees.

However, the Humboldt may be more efficient than the Conventional face in another regard. The sloping cut, being below the horizontal cut in the Humboldt, allows the butt of the tree to slip to the ground faster than does the Conventional face. When on uneven terrain, the ability to put the butt on the ground before the majority of the tree, can reduce breakage. This quicker release of the butt may also be safer in that the stump itself acts as a anti-kickback safety valve. This is especially true if a tree is felled uphill or into other standing timber.

FACE — TWO CUTS

Two cuts form the face or undercut. (Refer to Illustration 21). The relationship of one cut to the other is important. They must not cross, for in doing so they undermine the function of the holding wood. Here it is only important that the relationships of the two cuts be understood and one of the relationships is that they meet properly. The location of the two facing cuts is in the general direction the tree leans and specifically in the direction you want it to fall. The only time this is not true is when the tree is not leaning in the desired direction. In such a case the face is in the desired direction and the tree forced into it. An effective method of establishing the exact direction of the face is by the use of the handle bars of the chain saw. All saws have handle bars and they can be used to "sight" or "gun" with. (Refer to Illustration 23). "Sighting" or

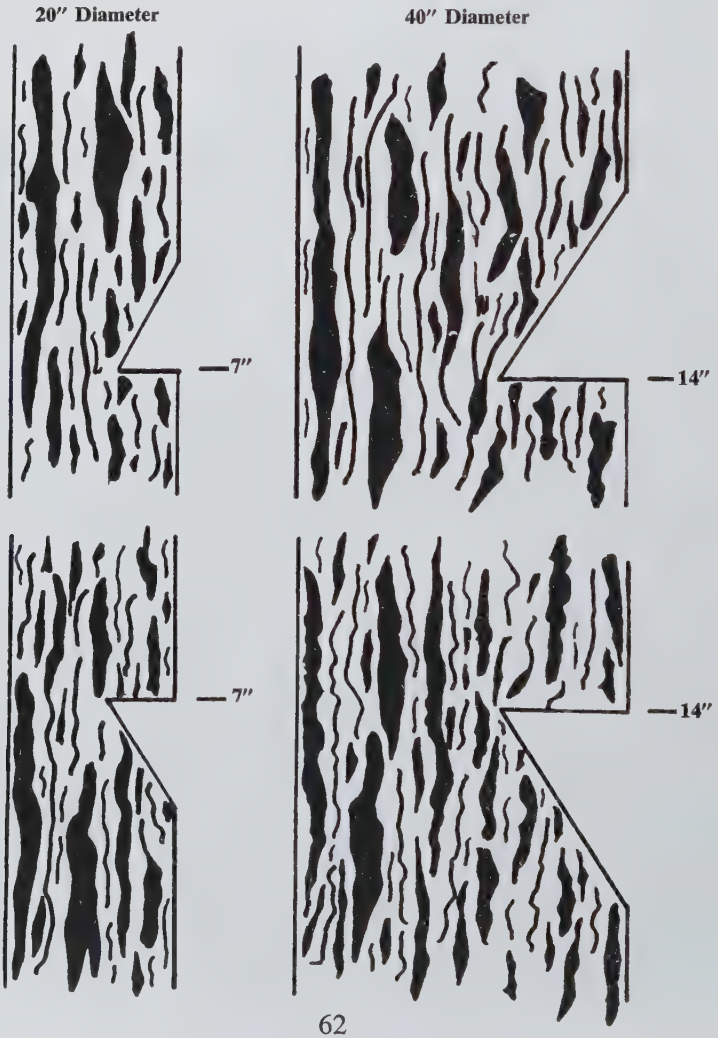
ILLUSTRATION 23
SIGHTING OR GUNNING WITH THE SAW'S HANDLE BARS

"gunning" with the handle bars involves continuing the horizontal cut of the face to a point at which the handle bars are in line with the desired falling direction. If gunning sights are properly used they are an effective part of falling technique.

Another relationship between the two face-forming cuts is their distance and direction from one another. Generally speaking, the horizontal facing cut depth is ⅓ or more the diameter of the tree being cut. (Refer to Illustration 24). The "or more" part of this statement is

ILLUSTRATION 24

A PROPER FACE SIZE — Horizontal cut minimumly 1/3 diameter of the tree — sloping cut angled enough to allow a wide face opening.



purposely included because the deeper the horizontal cut, the more angled the sloping cut should be. One of the most common facing problems is that the opening of the face is too narrow for the size of the tree. A narrow face closes quickly, and in Illustration 25 the tree is in a non-

ILLUSTRATION 25
PREMATURE CLOSING EFFECT OF A NARROW FACE

restricted, non-guided fall from the point where the face closes. The unguided fall may result, and often does, in the tree being several feet from the desired location upon landing. An uncontrolled tree creates a number of problems. These problems include breakage, bucking problems, problems of swamping out around trees that the lost tree has fallen into, crossing the lead, and safety. In Illustration 26, the face closes

ILLUSTRATION 26
PROPER CLOSING OF THE FACE

much later when the tree is quite close to the ground. The wide open face has directed the tree to the intended lay and has not released it to drift as has the narrow face. Again a deep horizontal cut and a long sloping cut are keys to successful tree positioning.

As suggested, an effective undercut is comprised of two separate cuts. However, situations may occur which force the faller to make a third and possibly a fourth facing cut. Such a situation may occur if the facing area contains abnormalities such as stump rot, cat-faces, or root protrusions. (Refer to Illustration 27). In each instance, the irregularity

ILLUSTRATION 27

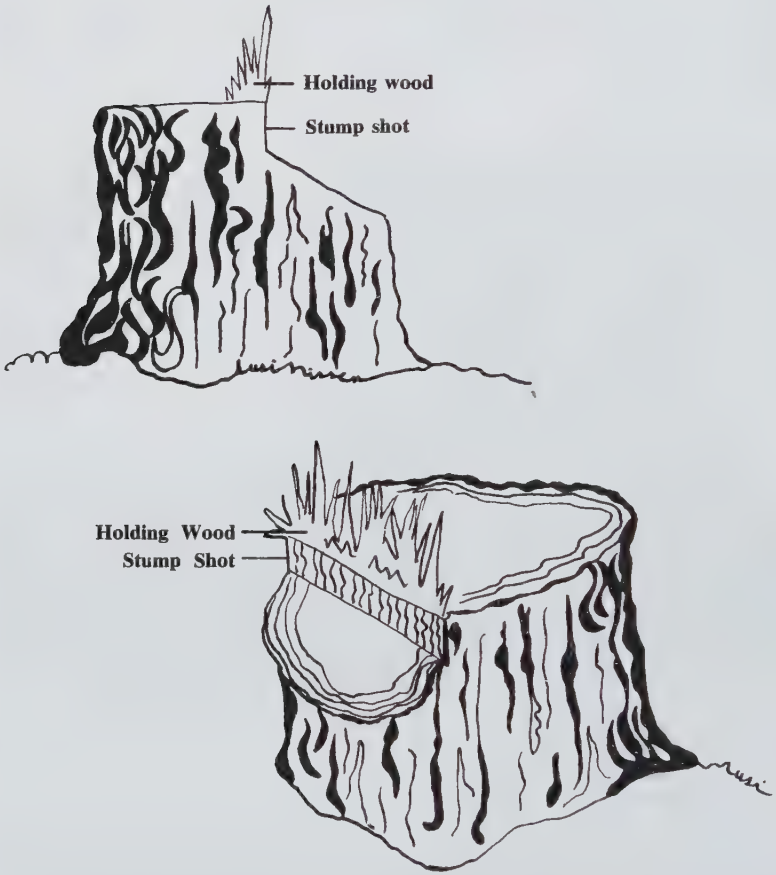
THIRD FACING CUT — After the face has been removed, the faller decides to remove a portion of the root protrusion which he feels may alter the direction of his tree.

may force the faller to make extra facing cuts to achieve an adequate face. If the faller does not make the extra cuts he has placed himself in a position in which he has two major options. He can fall the tree with the possibility of missing his intended lay, losing control of the tree and/or its barber-chairing. The second option available to him is that he enlarge the face by the use of a third and possibly a fourth cut. If the first option is selected, the faller is not a professional for he has disregarded some basic principles of professional falling procedure. He has not adhered to the basic ⅓ the diameter of the tree for the undercut. As a consequence he has also failed in his responsibility to do everything he can to save his tree and at the same time jeopardized his personal fate as well. Always do whatever is necessary to obtain a sufficient undercut. If more than two facing cuts are required, they must be used.

HOLDING WOOD AND BACKCUT

Other keys to the successful positioning of a tree, are the holding wood and backcut. The backcut is the third and final cut required to fall a tree. (Refer to Illustration 28). Its location is on the opposite side of

ILLUSTRATION 28



LOCATION AND HEIGHT OF THE BACKCUT — The height distance between the backcut and the horizontal cut of the face is minimumly 2″. This area is referred to as stump shot.

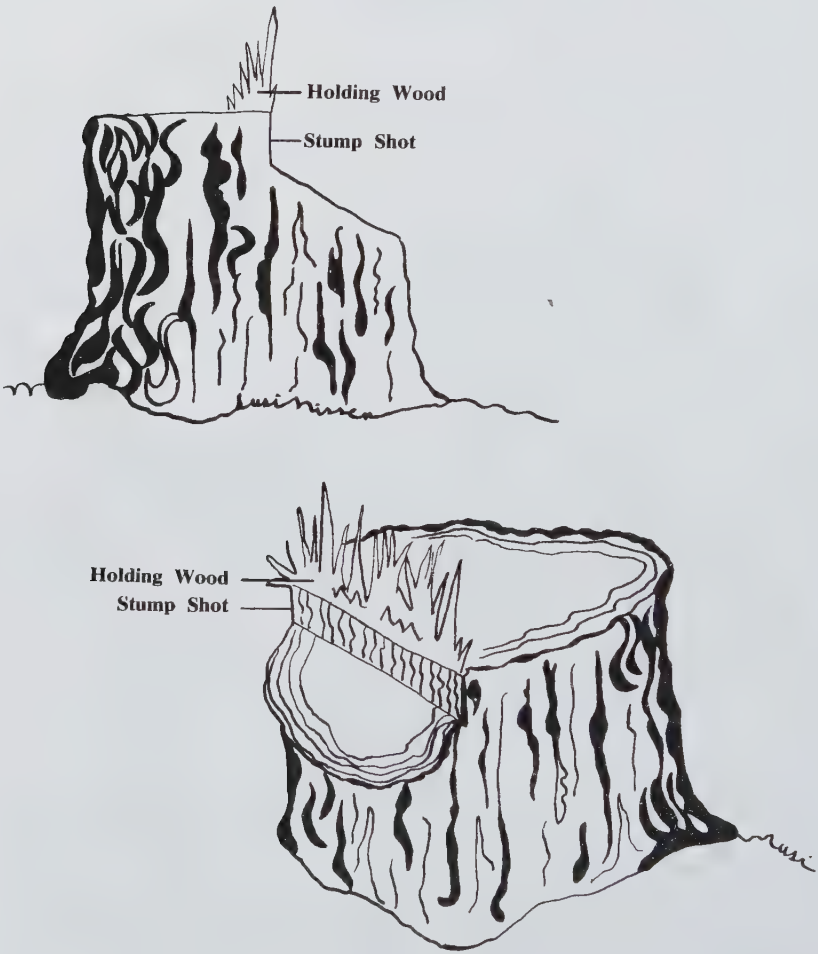
the tree from the face. It is sawn in a horizontal direction, and minimumly 2 inches above the horizontal cut of the face. The height of the backcut depends on the size of the tree involved. Smaller trees require less stump-shot than do larger ones. However, the distance of the backcut above the horizontal cut of the face must be at least 2 inches. This procedure forms an anti-kickback safety valve in case the tree

attempts to jump back over the stump. (Refer to Illustration 29). As soon as space is available, a wedge should be started in the kerf of the backcut. The faller should halt the continuation of the backcut every 3 to 6 inches, depending on the size and lean of the tree, and drive the wedge in tight. Be careful that the wedge or wedges are not driven in so far as to interfere with the continuing backcutting procedure. As previously stated, the wedge and single-bitted axe are important parts of the timber faller's essential equipment. The axe and wedges are used in combination to lift the tree into the face, thereby redistributing its weight to

ILLUSTRATION 29
SAFETY EFFECT OF PROPER BACKCUT HEIGHT

the face. They also prevent that tree which is "sitting back" from going over backwards. This allows the bar, and therefore the saw, to be removed from the stump. Wedges aid the faller by not permitting the kerf to close on his bar. As the backcut proceeds toward the face, it must be level and it must not cut through the wood directly behind the face. This strip is referred to as holding wood or hinging wood (Refer to Illustration 30). This narrow strip of wood must be left completely

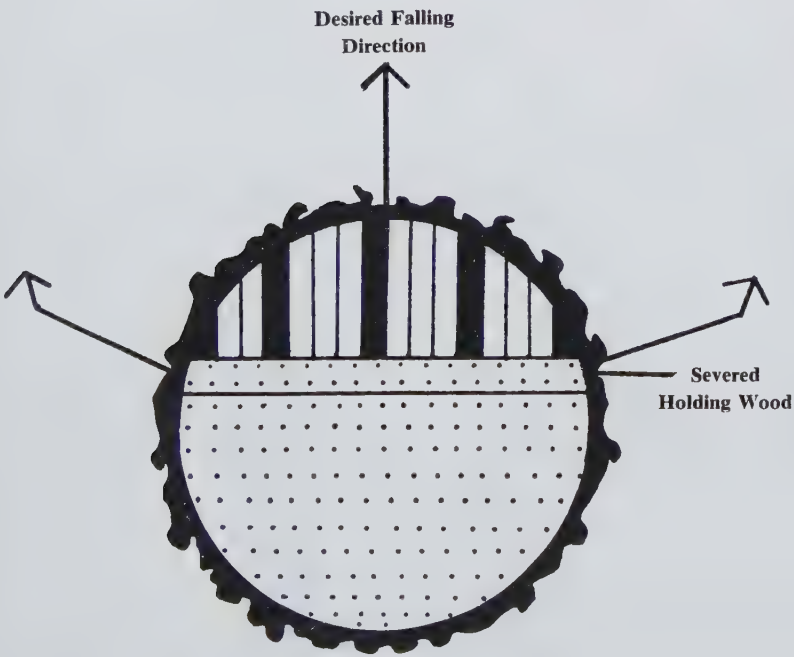
ILLUSTRATION 30



LOCATION OF THE HOLDING WOOD — The holding wood is located immediately behind the face and in front of the backcut.

across the stump. At first glance this section may appear to be inconsequential but it is, in fact, quite important. It has already been established that the face is important in not only allowing he tree to fall but also in guiding the direction of the fall. The holding wood secures the tree to the stump after the face has been removed and the backcut completed. It also has another important function. As the tree lifts off the stump, the holding wood maintains the tree's falling direction into the wide-mouthed face and prevents the falling tree from prematurely slipping or twisting off the stump before it is committed to the face. If the holding wood is completely severed, the wide-mouthed face wouldn't be of much consequence. If the holding wood is completely cut off, the tree would fall in any direction because it hasn't had time to settle into the directing face. (Refer to Illustration 31). Therefore, the backcut should continue

ILLUSTRATION 31



EFFECT OF SEVERING ALL OF THE HOLDING WOOD — The actual falling direction of this tree is anywhere between the two arrows.

Improper

Proper

until, by inspection, a narrow strip of holding wood remains across the stump. Make sure the holding wood is never completely cut off.

Another word of caution must be given while discussing the backcut. It has been suggested that good falling procedure requires that the area be secured prior to initiating the undercut. The same procedure must be followed prior to backcutting. The interval between facing and backcutting may result in someone entering the falling area. Therefore before the backcut begins the faller must shut off his saw and warn those who may be in the area.

On the technical side, reference must be made as to the most common mistake made while backcutting. This subject is discussed in detail in Chapter IV. Here it is only necessary to mention that sloping backcuts and/or backcuts below the face on one or both sides are the most common forms of improper backcutting. The cause and result of such improper cuts are among those which are the leaders of poor falling technique. Again a correct backcut is minimumly 2 inches above the horizontal cut of the face and level.

ESCAPING

Once the tree is committed to fall, don't hesitate at the stump. If for some reason, your saw hangs up and cannot be retrieved, leave it. A faller puts himself in an extremely dangerous situation waiting at the stump for the falling tree to lift far enough to release his saw. Never wait for your saw, leave it and run. But don't run aimlessly, proceed along the previously planned escape route. Remember, don't run straight back; run back but to one side. If an escape route is properly planned, you should be twenty feet or more from the stump and behind another tree by the time the tree being felled hits the ground.

However, the reality of some falling situations may make it impossible for the minimum direction and distance to be accomplished. Falling on extremely steep ground, clear cuts, and rock bluffs are some examples of such situations. If an extremely short escape route is all that is available to the faller, the tree should be left and removed by other means such as blowing it off the stump by the use of powder or by the use of various equipment and lines. An escape route of less than 20 feet is a safety problem that should be conscientiously evaluated.

ANALYZING THE STUMP

Perhaps the most effective method the novice or experienced faller can use to improve his falling technique is to closely observe his stumps. This is especially true if the tree does not go where the faller thought it would go The value of observing the stump is that the faller gets immediate feedback as to what happened and what should have, or could have, been done to correct it. Everything the faller does while falling is captured in the remaining stump. (Refer to Chapter IV). Depth of the horizontal cut, angle of the sloping cut, width of the face opening,

direction of the face in relation to both desired and actual falling location, levelness and height of the backcut, and width of the holding wood are evident. Also evident is improper technique such as crossing facing cuts, sloping facing cuts and/or backcutting, failure to wedge and many other poor falling techniques. Therefore, by observing the stump and asking why a tree went where it did or didn't, and how the situation could have been eliminated, the faller learns to evaluate, analyze, and adjust for numerous variables, whether in the realm of technique or in the tree itself (rot, lean, drift, etc.).

CHAPTER IV
IMPROPER FACING

Thus far the standard technique and functions of the face, holding wood and backcut have been discussed. The relationships of these essential falling procedures remain constant regardless of the size or shape of the tree. But many fallers continuously alter, or attempt to alter, these unchanging qualities. This alteration of relationships results, directly or indirectly, in numerous accidents, deaths and loss of timber due to breakage. If the execution of technique required to fall a tree, and the understanding of how the three cuts work together is easily learned, how can their widespread misuse be explained?

It appears that two basic explanations are appropriate. Either the faller doesn't understand the mechanics of falling or he doesn't care. If we assume the faller doesn't understand the technique and mechanics of falling, the following will help. The correct "at the stump" falling procedure has previously been discussed. This section will explain why and what happens when improper technique is used.

NO FACE OR UNDERCUT — THE FACELESS TREE

Causation: The faller thinks that he can backcut the tree off the stump before it can fall, and therefore that the constant relationships of the face do not apply to small trees. (Refer to Illustration 32).

Mechanical analysis: Any tree can be felled without a face. It is

ILLUSTRATION 32

NO FACE OR UNDERCUT --- THE FACELESS TREE — In this instance the backcut is the only cut made.

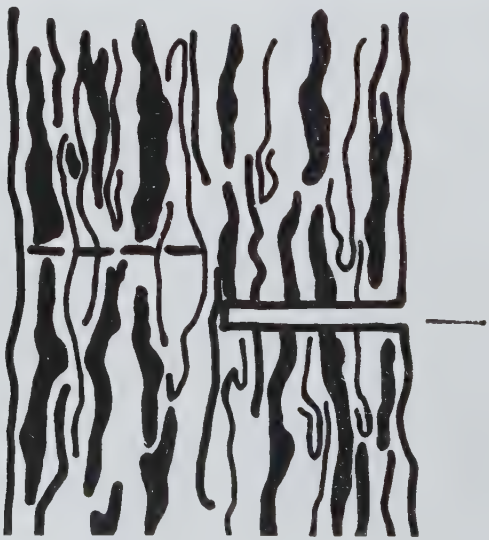
what occurs during and immediately after the tree is committed to fall that is of consequence. Let us examine a tree that is felled without the face being sawn. Regardless of the size of the tree, it will barberchair. As the backcut proceeds, the tree is slowly committed to its natural lean. In doing so the front section becomes compressed while the back-cutting section becomes tensioned. As the tensioned wood is relieved by the backcut, it transfers more pressure to the front area already under compression. A point is reached where the tree is falling much faster than the remaining holding wood can be cut. At this point the tree, now compelled to fall, will vertically split attempting to take the path of least resistance, and kick back. The faller is in real trouble, for the tree will quickly kick back and most likely catch the faller before he can get away. The tree itself will be greatly reduced in value due to the long vertical split, and even more so if its unguided fall lands it across a stump. This example assumes that the faller has picked the correct lean. If the lean is back or back and to one side, the tree will respond by falling in the direction of those forces. Regardless of the size of the tree, every tree must be faced.

KERF FACE

Causation: The faller assumes that the tree is small enough that a true face isn't necessary. (Refer to Illustration 33).

Mechanical analysis: A kerf face is an undercut comprised of only one cut that is the width of the chain. It is characterized by the absence of a sloping cut. As the backcut proceeds, the tree is committed to

ILLUSTRATION 33



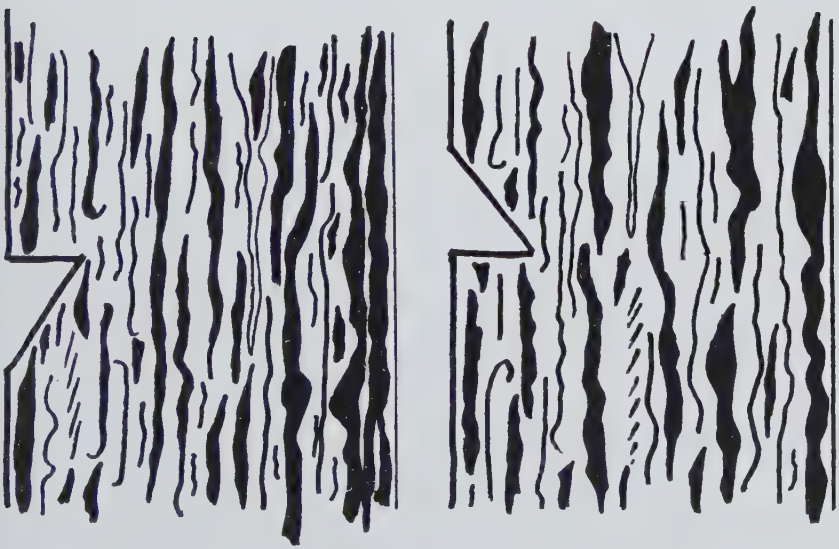
KERF FACE — Characterized by the absence of a sloping cut.

the face, but the face is so narrow that it immediately closes. This area having nowhere to go becomes highly compressed. The compression increases as the backcut continues toward it. A point is reached in which the disparity between compression wood and tension wood is so great that the tree takes the path of least resistance and vertically splits. This type of face, if it can be called one, should never be used. As in the previous example, an assumption is made that the correct lean has been established. The variables of the trees' natural forces and their resulting effects are the same. Remember, it takes three separate cuts, which have constant relationships, to fall a tree properly. A top and bottom cut are necessary, and the opening should be large.

HORIZONTAL CUT OF THE FACE NOT SAWN INTO THE TREE ENOUGH TO ALLOW A LARGE OPENING

Causation: Faller either did not observe the depth of the horizontal cut in relation to the size of the tree involved, and/or he does not understand the purpose and function of a deep horizontal cut. (Refer to Illustration 34).

ILLUSTRATION 34



HORIZONTAL CUT OF THE FACE NOT SAWN INTO THE TREE ENOUGH TO ALLOW A LARGE OPENING — The horizontal cut is not at least 1/3 the diameter of the tree.

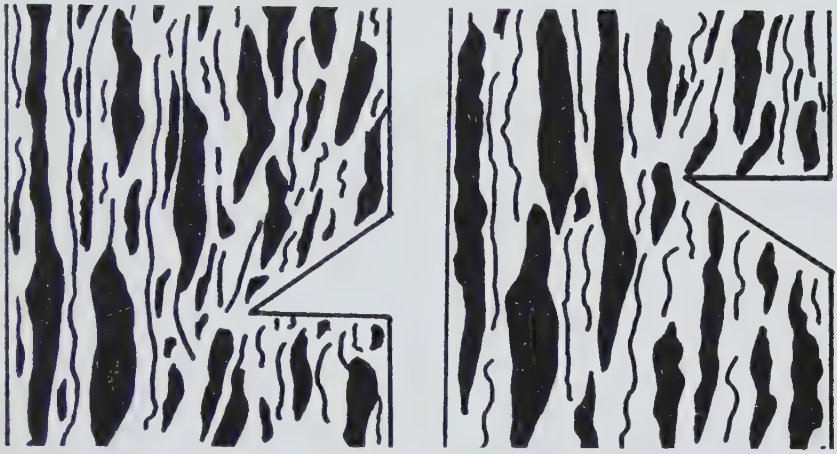
Mechanical analysis: A horizontal cut, which is not sawn into the tree far enough, carries with it a small face opening if the two face cuts are to meet properly. The small face creates a situation in which the tree is released prematurely from the stump. This occurs because the face, being small, closes quickly and the holding wood is either broken off or torn out. The tree is now unguided from the point where the face closes. The tree's destination is not where it was intended which constitutes loss of control. On page 64 the results of a tree that has been lost control of have been discussed. The horizontal cut should always be at least 1/3 the tree's diameter in depth.

SLOPING CUT NOT ANGLED ENOUGH TO ALLOW A WIDE OPENING

Causation: Faller either did not observe the angle of the sloping cut in relation to the required opening needed for the particular tree, and/or does not understand the purpose and function of a wide-mouthed face. (Refer to Illustration 35).

Mechanical analysis: The same situation as above results from a cut that does not allow a wide-mouthed face. The horizontal cut may be sufficiently deep enough for the particular tree but the sloping cut does not angle enough to create a wide opening. As the tree is committed to fall, the face quickly closes breaking off the holding wood. If it doesn't break the holding wood, a barber-chair could result. If the holding wood is broken off, the tree is prematurely released and loss of control results. Again, the two face-forming cuts have a constant relationship that must be maintained at all times. In this particular case, the sloping cut must be sufficiently angled enough to allow a wide face opening.

ILLUSTRATION 35

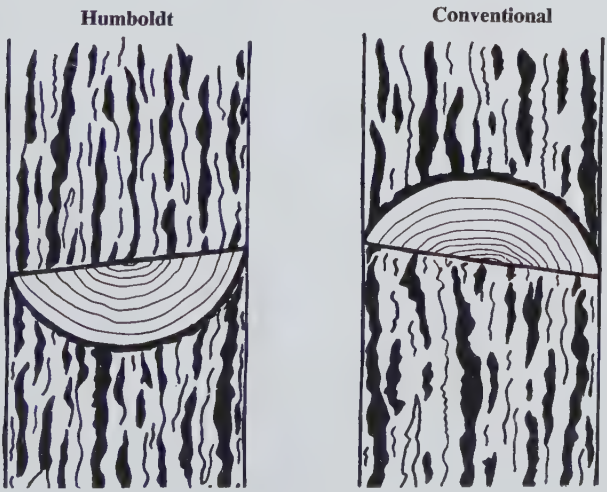


SLOPING CUT NOT ANGLED ENOUGH TO ALLOW A WIDE OPENING — The horizontal cut is 1/3 the diameter of the tree but the sloping cut not angled enough to allow a wide-mouthed face.

AN UNLEVEL FACE

Causation: An unlevel face is a result of the faller not observing the angle of the face in relation to the tree and/or he does not understand the purpose and function of a level face. (Refer to Illustration 36).

ILLUSTRATION 36
AN UNLEVEL FACE

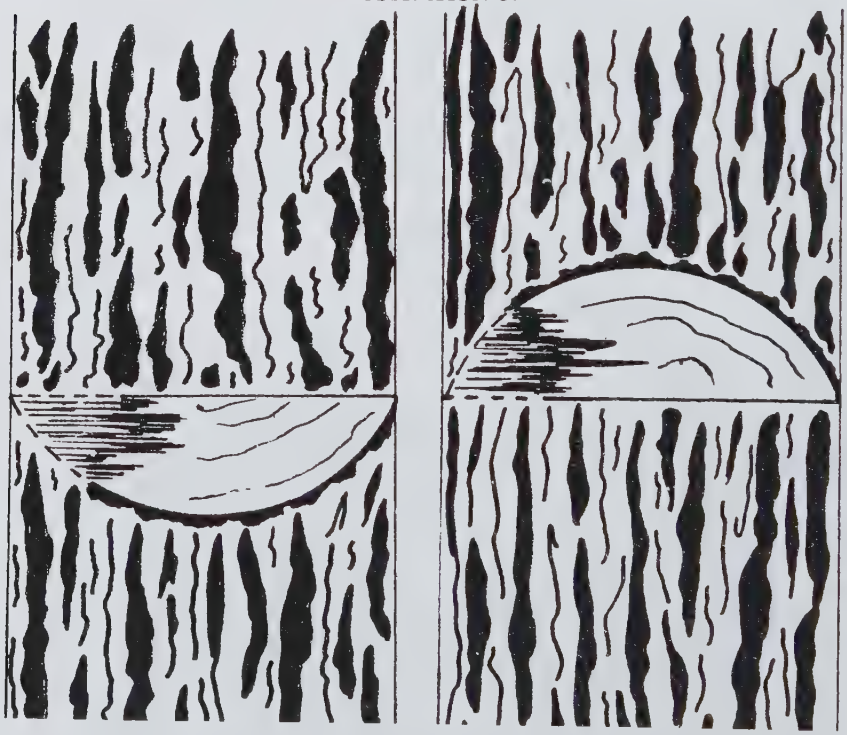


Mechanical analysis: When the two face-forming cuts are not level in relation to the face and tree, their relationship is altered. As the face closes, the one section closes much faster than does the other section. The closed section acts as a pivoting point. The falling tree enters the face and is held by the closed section. The continued forward pressure breaks off the holding wood in the closed section and pivots the tree toward the closed section. The open section of holding wood secures its side to the stump, thereby swinging the tree to the left. Such a face results in loss of control of the tree and should not be used. Again, the two face-forming cuts have constant relationships, and in this instance they must be level to each other and the tree.

FACE NOT CLEANED OUT

Causation: Failure of faller to observe the face prior to falling the tree, failure to recognize what constitutes an "uncleaned" face, or failure to realize what effect it would have on the relationship of the face to the tree. (Refer to Illustration 37).

ILLUSTRATION 37



FACE NOT CLEANED OUT — In this Illustration the facing cuts match, but the faller neglected to clean the face out. This remaining wood is represented by the shading in the corner of the face.

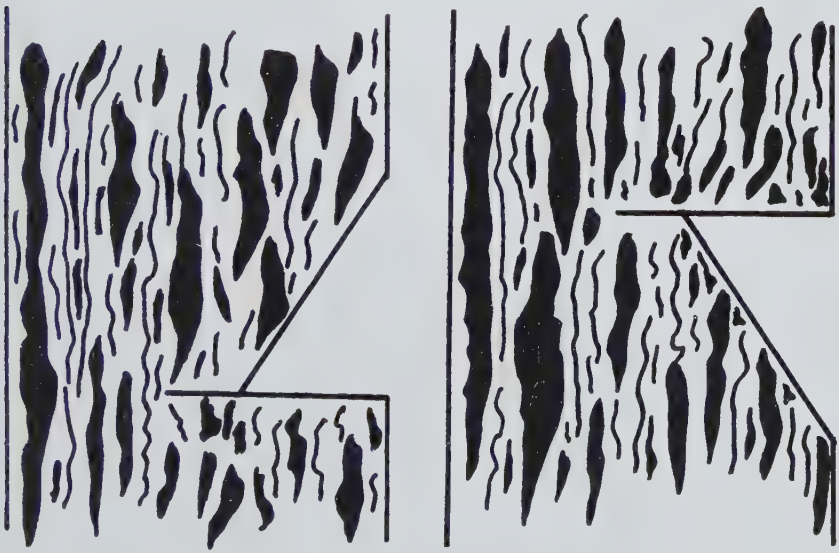
Mechanical analysis: A face which is not completely cleaned puts in play distortions in the basic relationship between the face and the tree. In this particular case, the alteration of forces acts much the same as that resulting from an unlevel face. The falling tree is not allowed to evenly fall into the face. The result is that the tree will pivot toward the unobstructed portion of the face. In doing so it will pull to that side. A proper face must be completely cleaned out so the face can properly guide the tree's falling direction.

An improper face is not the only determining factor that alters the relationship of the falling procedure. Holding wood, in conjunction with the backcut is also directly involved in poor or improper falling technique. This being so, the following section will describe how specific alterations affect control of the intended falling direction.

HORIZONTAL CUT SAWN PAST SLOPING CUT ON ONE SIDE

Causation: Failure of the faller to check the face for crossing cuts and/or failure to understand how such an alteration in their relationship effects the intended falling direction. (Refer to Illustration 38).

ILLUSTRATION 38
HORIZONTAL CUT SAWN PAST SLOPING CUT ON ONE SIDE



Mechanical analysis: The extension of the horizontal cut past the sloping cut reduces, if not eliminates, the function of the holding wood on one side of the tree. The effect is that the cut off side will swing or pivot to the holding side. This occurs because as the tree is committed to the face, one side of the tree is secured to the stump while the other

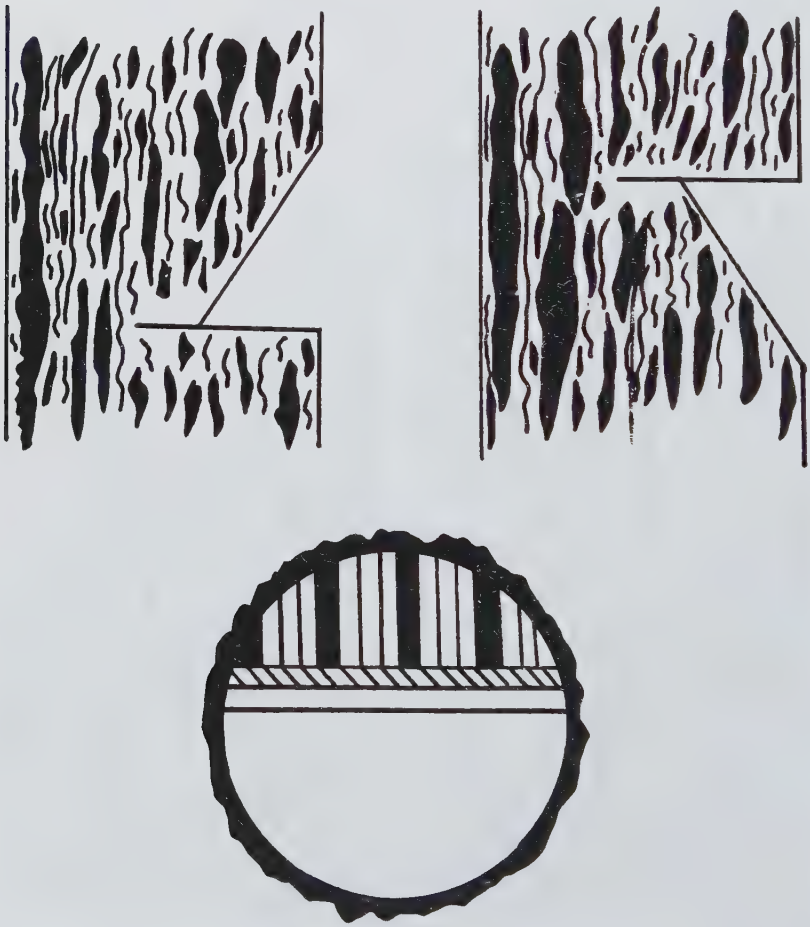
is not. The natural response of the tree will be a swing to the secured side. It is realized that this type of distortion has a function in falling, and that function will be discussed later. Here, the distortion is assumed to be unintentional and/or misused.

HORIZONTAL CUT SAWN PAST SLOPING CUT COMPLETELY ACROSS THE STUMP

Causation: Generally the faller does not observe the face and/or fails to recognize the distortion. (Refer to Illustration 39).

ILLUSTRATION 39

HORIZONTAL CUT SAWN PAST SLOPING CUT COMPLETELY ACROSS THE STUMP.



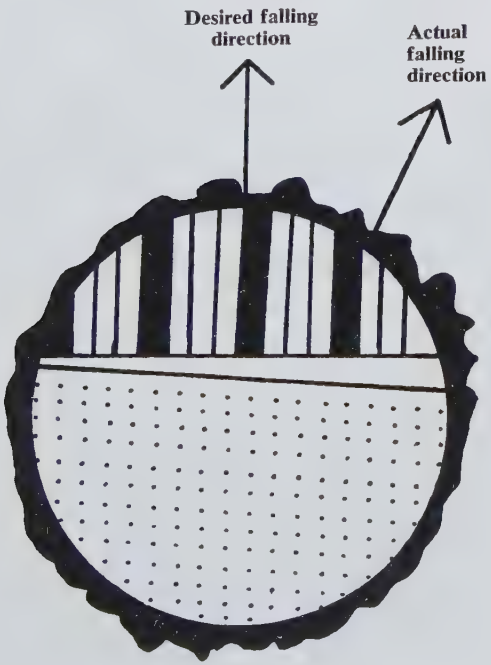
Mechanical analysis: The continuation of the horizontal cut completely across the stump establishes a face within a face. As the tree is committed to fall, the intended horizontal cut, being only the width of the chain, closes immediately. This closing causes the committed tree to momentarily hesitate. In doing so, extreme pressure concentrates in the holding wood. If the holding wood is not cut up close to the back of the extended horizontal cut the tree will barber-chair. If the holding wood is cut up close the tree will respond by "jumping" off the stump, rather than falling into the face and being guided. Such an extension of the horizontal cut has an application to falling which will be discussed later. Here its use is unintentional.

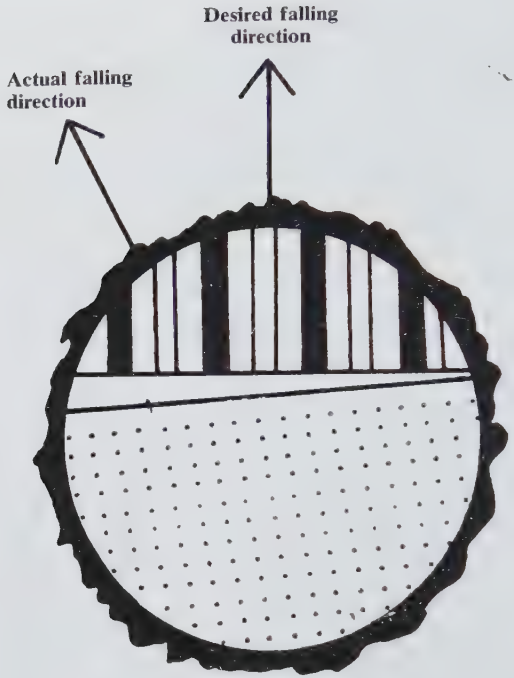
HOLDING WOOD UNINTENTIONALLY VARIED IN WIDTH ACROSS THE STUMP

Causation: Generally a result of the faller not checking the offside for amount of holding wood remaining and/or his not realizing misuse of the holding wood alters the intended falling direction. (Refer to Illustration 40).

ILLUSTRATION 40

HOLDING WOOD UNINTENTIONALLY VARIED IN WIDTH ACROSS THE STUMP.





Mechanical analysis: If the width of the holding wood is not the same completely across the stump, the tree will be pulled, depending on the variation of width, to the side of wider holding wood. This technique is valuable in positioning trees and is commonly used. The reference here is to its unintended use.

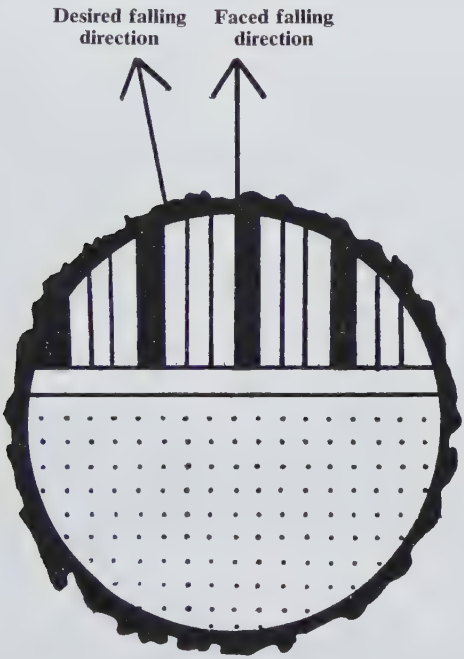
PROPER FACE BUT NOT FACED IN ACTUAL DIRECTION

Causation: Failure of faller to check the exact direction of the face and/or failure to understand the importance of exact positioning of the face in relation to the desired lay. (Refer to Illustration 41).

Mechanical analysis: Many times a tree is properly faced but the tree doesn't fall where it was intended. The basis for the difference between where it was intended to fall and where it actually falls is that the faller did not position the face properly. The actual direction of the face is easily determined. Insert a tape at the intersection of the two facing cuts. Establish and mark the distance half way across the opening. Now the tape is placed at a right angle to the center mark. The direction of this right angle will establish where the tree will actually fall. If the desired and actual lay are not the same, the faller can enlarge the face to compensate for the difference.

ILLUSTRATION 41

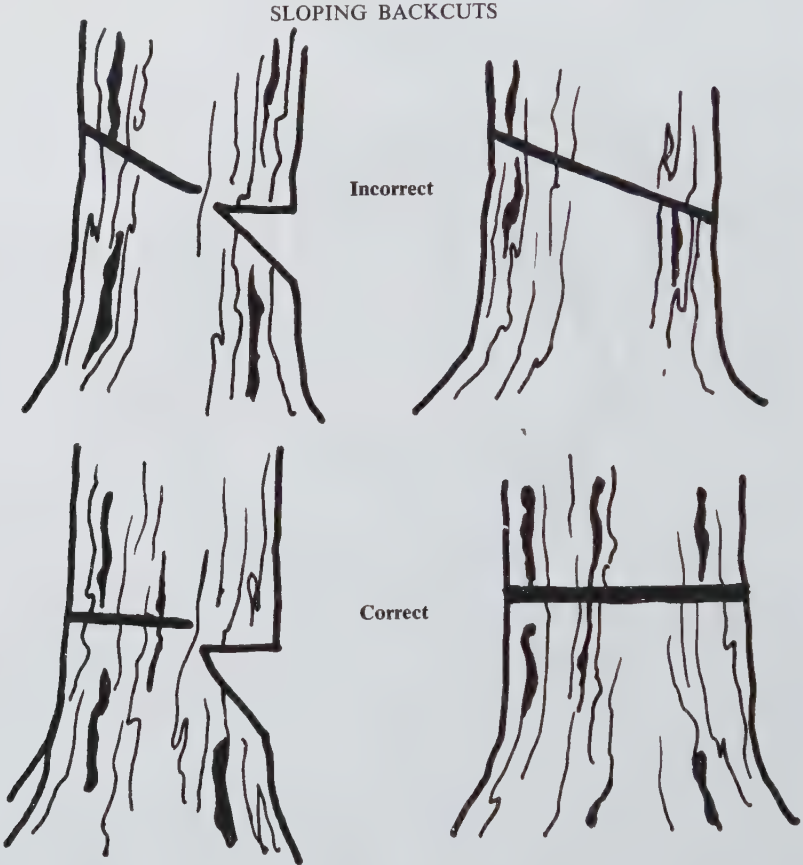
PROPER FACE BUT NOT FACED IN ACTUAL DIRECTION — The techniques of gunning or sighting can be used to eliminate this situation. (Refer to Illustration 23).



SLOPING BACKCUTS

Causation: Generally a result of a faller either not recognizing the appearance and function of the backcut or his being slipshod. (Refer to Illustration 42).

ILLUSTRATION 42
SLOPING BACKCUTS



Mechanical analysis: Basically, sloping backcuts undermine the function of the holding wood. Those illustrated are sloping enough to alter the direction of the tree drastically. The sloping backcut carries with it a variation of holding wood. The tree responds like it does in any situation in which more holding wood remains on one side than the other. If the tree's lean has been misjudged, wedging is a real problem. In such a case, the wedging direction is pushing forward rather than lifting. The same effect results when the backcut, whether level or sloping, is sawn below the face. In this case the holding wood is sawn completely off. The backcut should always be never less than 2 inches above the horizontal cut of the face and level.

The safety valve junction of the 2″ stump shot minimizes, if not eliminates, the possibility of a tree kicking back over the stump. (Refer to Illustration 43 for combinations of improper facing and backcutting).

ILLUSTRATION 43
OTHER FORMS OF IMPROPER "AT-THE-STUMP" TECHNIQUE

1. Sloping backcut.
2. All the holding wood severed.
3. Sloping cut of the face extremely narrow.

1. Sloping backcut.
2. Backcut sawn below horizontal cut of the face.
3. Holding wood cut off on one side.
4. Sloping cut of face not properly angled.

1. Extra holding wood on far side — failure to check the off-side.
2. Holding wood cut off on near side.
3. Sloping face cut not properly angled.
4. Appears that a springboard hole was sawn beneath the holding wood on the near side.

1. Holding wood completely sawn off.
2. Unlevel face.
3. Insufficient face sloping cut.

1. Backcut not 2″ above horizontal cut of the face.
2. Holding wood completely sawn off.
3. Kerf face.

1. Backcut sawn below horizontal cut of the face.
2. Horizontal face cut less than 1/3 of the diameter of the tree.
3. Sloping face cut not properly angled to allow a wide mouth.

Premature face closing plus remarks in F.

1. Holding wood severed.
2. Unlevel face.
3. Insufficient sloping face cut (the piece of wood on the stump is the width of the removed face).

1. Sloping backcut.
2. Backcut not minimumly 2″ above horizontal face cut.
3. Either a kerf face or insufficient sloping face cut.

1. Holding wood completely sawn off.
2. Kerf face or insufficient sloping cut.

1. Backcut not 2″ above horizontal face cut.
2. Holding wood completely severed on one side.
3. Horizontal face cut less than 1/3 the diameter of the tree.
4. Sloping cut not angled enough to allow a wide face opening. (The white tape indicates the direction th tree was faced.

Guess what?

Guess what?

CHAPTER V

VARIATIONS OF THE BASIC FACE

To avoid any misunderstanding, it is not implied in the previous chapter that any alteration of the basic face, holding wood and backcut should never be used. Making the horizontal cut 1/3 the diameter of the tree, using a wide-angled sloping cut, and maintaining holding wood completely across the stump with a level backcut, will enable the faller to handle 99% of the trees he will encounter. However, situations occur that need special consideration. Some of the following intentional alterations of the basic "at the stump technique" can help solve such situations. If the primary function of a timber faller is to safely fall and utilize as much of the tree as possible, then whatever means necessary to accomplish that goal are applicable. This chapter considers the knowledgeable and intentional alteration of the face, holding wood and backcut.

FALLING AGAINST THE LEAD

Generally, if a tree is leaning directly opposite the lead, it can be felled in that direction. However, situations may be present which will not allow the tree to be felled in its lean direction. Perhaps a road would be crossed, it would be felled into standing timber, or severe breakage would result. Another reason for falling a tree against its natural lean results from either improper strip layout or keeping trees in the lead. In the first case the faller is faced with a situation in which he must fall a considerable number of trees against their lean. Although many techniques can be used to accomplish this, what is being suggested is that if proper strip layout is established fewer trees will have to be fought with. In the second case where the faller commonly encounters trees which naturally lean across the established lead, he is either forced to do a good deal of wedging and/or use special falling techniques to maintain the lead and minimize breakage. It is the general consensus of professional timber fallers that wedging and/or special falling techniques are essential to successful falling. So, for various reasons, the faller must fall trees opposite their lean. To accomplish this task he must redistribute the tree's weight. This can be accomplished by the use of wedges. (Refer to Illustration 44). Face the tree in the desired direction. Start the backcut and as soon as room allows, insert two wedges as shown. Be sure that the bark has been removed from the area in which the wedges will be placed. Drive the wedges alternately until they are tight. Continue the backcut and drive the wedges up tight again. Continue this process until enough lift has been achieved to transfer the tree's weight from the backcut area to the face. Make sure that you don't sever all of the holding wood.

ILLUSTRATION 44

FALLING A TREE AGAINST ITS NATURAL LEAN — Steps to be taken are listed alphabetically.

If the faller wants to fall a small tree in the opposite direction that it leans, the process is altered but the theory is the same. (Refer to Illustration 45). A small tree may be so small that space is not available

ILLUSTRATION 45
FALLING A SMALL TREE AGAINST ITS NATURAL LEAN

A. Backcut.
B. Insert and drive wedge.
C. Saw and remove face.
D. Continue to drive wedge.

for both the wedge and the bar. In such a case, cut the backcut first. Proceed with this cut up to the point at which sufficient room is left for the holding wood and the face. Insert a wedge and drive it in tight. Now cut and remove the face. The final step is to finish driving in the wedge to lift the tree into the face.

Another effective method of falling a tree opposite its lean is by the use of one or more hydraulic jacks. Generally, jacks are only used when the tree involved is quite large. The following procedure should be followed when attempting to jack a tree opposite its lean. (Refer to Illustration 46). Saw and remove the face. Next, establish the height of the backcut and saw in several inches. Now cut the footing upon which the jack will sit. The jack footing should be sawn so that the jacks top, when compressed, is at the same height as the backcut. Place a metal pad on top of the jack plunger. The pad distributes the area of the upward push to a broader base. As the backcut continues, the jack should be raised to lift the tree. To promote an even lift, wedges

ILLUSTRATION 46

FALLING A TREE AGAINST ITS NATURAL LEAN WITH THE USE OF A HYDRAULIC JACK.

Sawing the jack hole.

Removing the block.

Redistributing the tree's weight to the face. Notice the accompanying wedges.

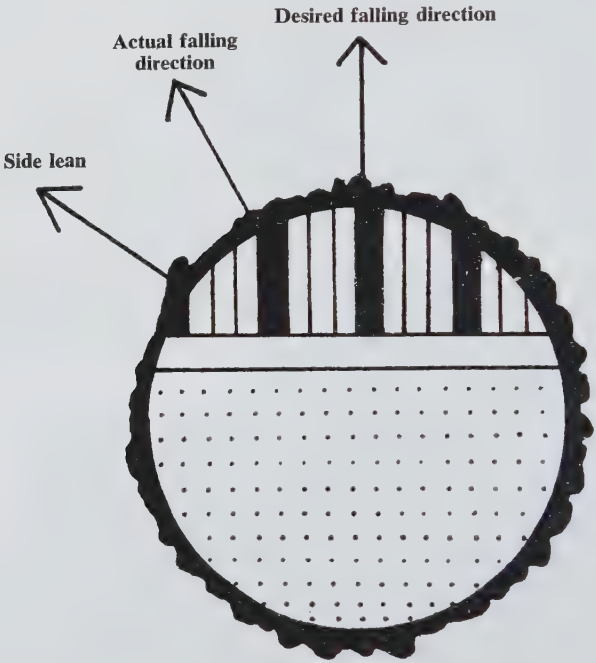
The tree is properly committed to the face.

should be placed on both sides of the jack and driven in as the jack lifts the tree. If the tree is unusually large it may be necessary to use two hydraulic jacks. The purpose of the jacks, whether one or two, is to redistribute the weight of the tree from its natural lean to the desired. One final comment should be made. When cutting jack footings, be sure that the section is not removed from beneath the holding wood corners. If jacks are placed under the holding wood sections, the function of the holding wood will be altered.

SLIGHT SIDE LEANERS

Many times the faller will encounter trees which either have a slight side lean or are not leaning in the desired direction. If such a tree is faced to the desired direction and an equal amount of holding wood is left completely across the stump, the tree will not fall where you intend it to fall. (Refer to Illustration 47). The procedure used to

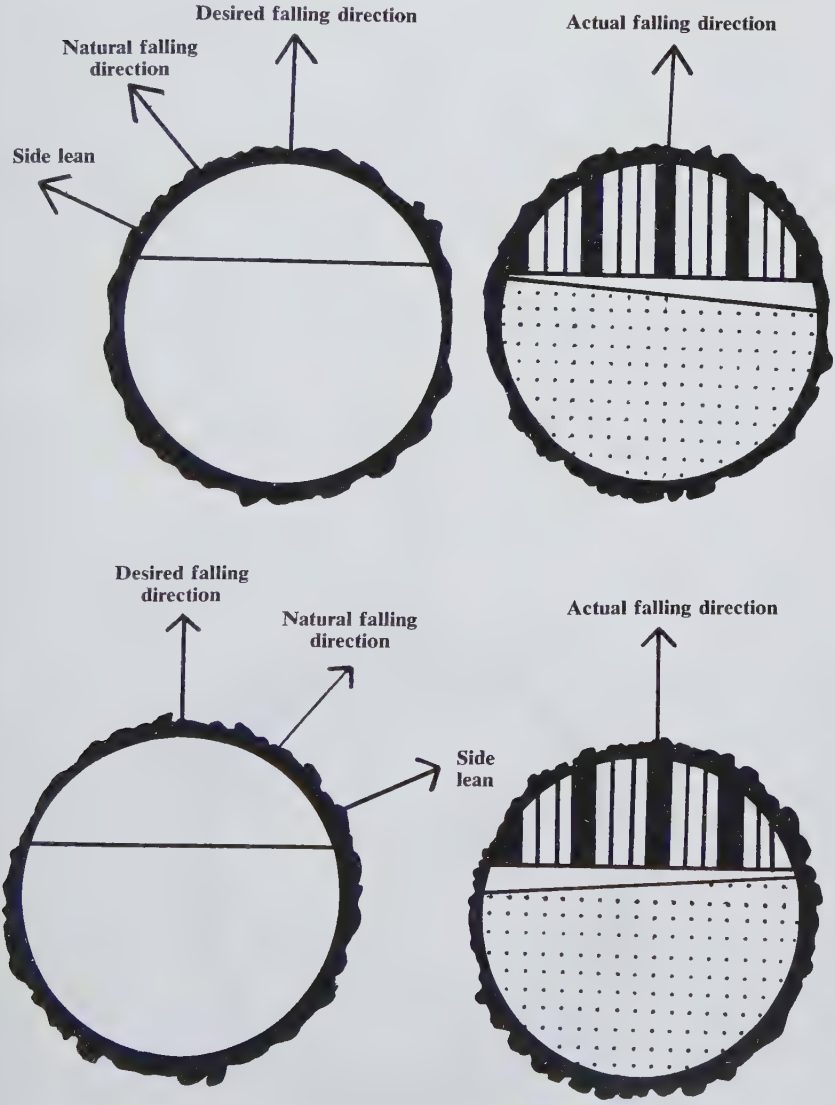
ILLUSTRATION 47
EFFECT OF NOT COMPENSATING FOR SIDE LEAN



correct this situation is simple and effective. Face the tree in the direction you want it to fall. After the face has been removed, check to see that it will guide the tree where you want it to fall. Noting that the tree is actually leaning to the left of where you want it to fall, purposely hold more wood on the right side. (Refer to Illustration 48). As soon as room allows, insert a wedge. As the tree lifts off the stump, the narrower section of the holding wood on the left side will break off. The wider section on the right side will secure that section of the tree to the stump longer. The result is that the tree will pull to the right into the desired lay position. If the tree is leaning to the right, the holding wood on the left would be wider than it would be on the right. This tree would then pull to the left. The manipulation of holding wood is

an extremely important part of the faller's technique. Again, a well cut, wide, open face and proper use of the holding wood will enable any faller to handle the majority of the trees he will encounter.

ILLUSTRATION 48
METHOD OF COMPENSATING FOR SIDE LEAN



HEAVY LEANERS TO THE LEAD

Another type of tree commonly encountered are those which lean heavily toward the established lead. The faller is forced by circumtance to alter the basic face, holding wood, and backcut to solve this particular problem. Several falling techniques are used and each will be discussed in detail.

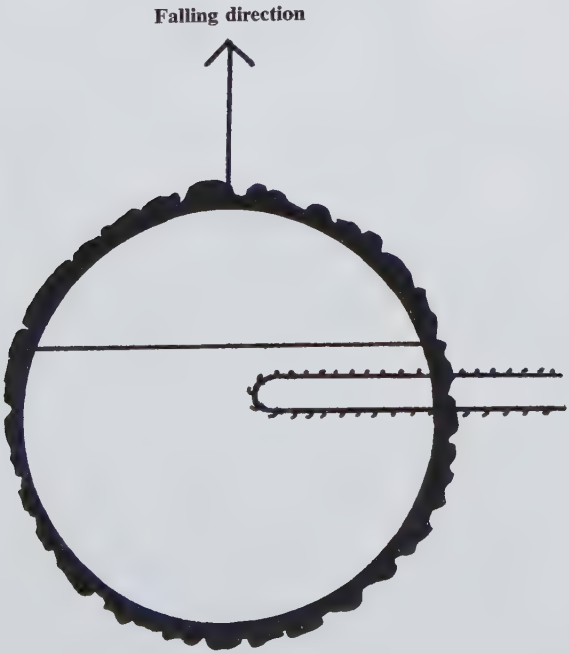
Illustration 49 shows a large tree that has a heavy head lean toward the established lead. When the faller attempts to fall such a tree, he must alter the procedure he normally uses. As stated on page 51, irregularities of the tree such as stump rot and cat-faces may require "extra" facing cuts. If a tree is leaning heavily, a sufficient face may also not be able to be sawn. Therefore, if a third or fourth facing cut is required it must be made. The heavy lean toward the lay causes the facing area to be compressed, for the wood cells are pressed together. The backcut area is tensioned. The tensioned cells are elongated or stretched. The horizontal cut of the face should be deeper than the normal ⅓ of the diameter and the sloping cut should be sawn in a manner that allows a correspondently large face opening. Sawing and removal of the face in this compressed area creates more tension on

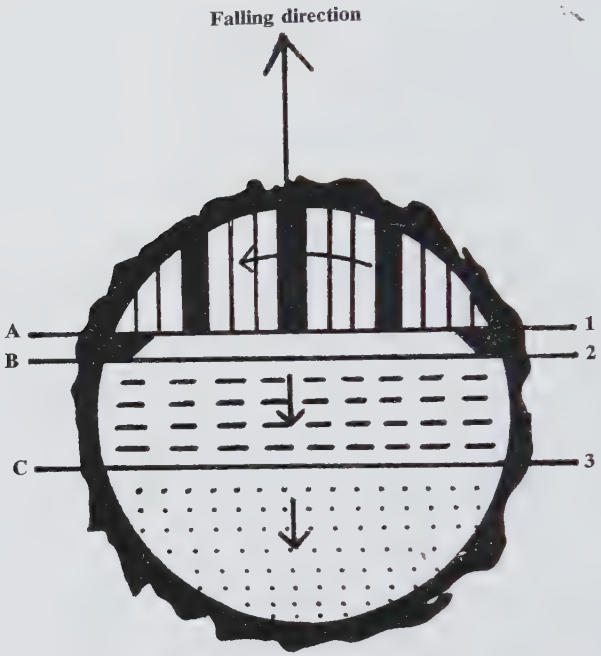
ILLUSTRATION 49
DIRECTIONAL FORCE OF HEAVY HEAD LEAN TO THE LEAD

the backside. With the face removed, the remaining area left to hold the tree up is greatly diminished, and increased tension results. If the standard backcutting procedure was initiated, the tree would barber-chair. As the backcut is sawn, tension is intensified in front of the kerf and relieved behind it, and the vertical split occurs. Immediately the tree attempts to fall, but an excessive amount of holding wood remains. The holding wood secures the tree to the stump, but the relieved tensioned area is now committed to fall. The sawn backcut area splits vertically and a barber-chair results.

Generally, to avoid barber-chairing this tree, or any other leaner in a similar position, three methods of backcutting are used. These methods are: 1) side-boring the backcut, 2) side-notching the backcut, 3) and boring the face. If the method of side-boring the backcut is selected, the saw is turned sideways allowing the saw chain to make a horizontal incision. This cut should be level and 2 inches above the top cut of the face, as would any backcut. (Refer to Illustration 50).

ILLUSTRATION 50
SIDE-BORING THE HEAVY HEAD LEANER





1. Dog in at 1 and cut to A. 2. Bore in at 2 and cut to B. The saw direction is indicated by the arrow. 3.Nip the corners. 4. Dog in at 3 and cut to C. Notice the direction of the cut is away from the face.

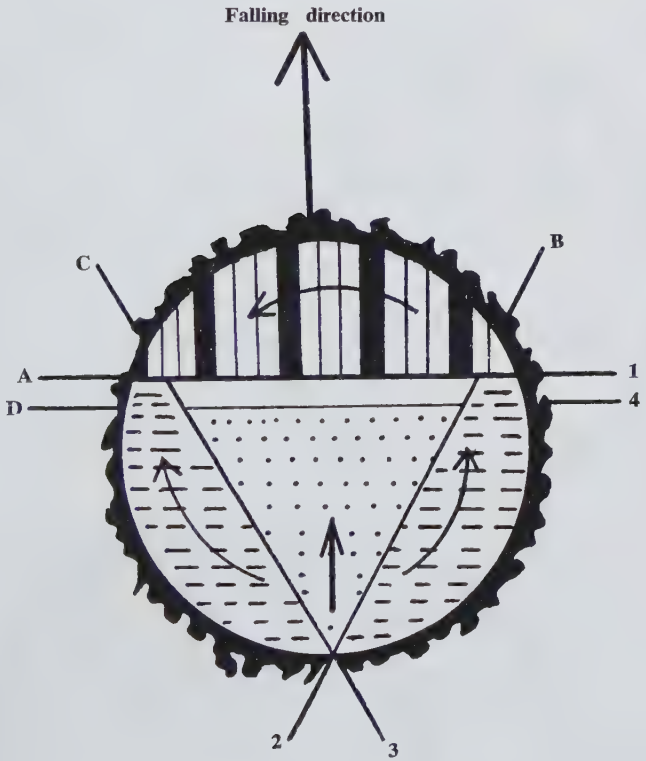
The bar is pushed into the butt behind the face leaving a section of holding wood between it and the face. The sawing direction is not toward the face but back in the opposite direction. The distance of this cut is dependent on the severity of the tree's lean but several inches of "back" wood must remain. Check the offside to see if the boring cut has reached completely across the stump. If the cut has not reached across the tree, or if you are uncertain, insert your bar in this side and cut to the same position you have on the other side. Before initiating the final cut, the faller should nip the corners of the holding wood. Heavy leaners fall so quickly that once they begin the corners of the holding wood cannot be cut up. To prevent root-pulling or slabbing, the faller should nip the corners 2 to 4 inches depending on the size and lean of the tree.

Once the boring and corner-nipping has been completed, the only holding wood remaining is a section immediately behind the face and another section at the back of the tree. The holding wood behind the face serves the same function as it does in any tree. At the back of the tree, the section of wood secures the tree to the stump while the

center portion is being severed. The final step is to cut off this back holding wood, allowing the tree to fall freely.

Another method of backcutting a heavy leaner is referred to as side-notching. The backcut in side-notching is comprised of three different cuts. One across each side and one across the back. (Refer to Illustration 51). Place the saw so the bar is horizontal and level. Cut

ILLUSTRATION 51
SIDE-NOTCHING THE HEAVY HEAD LEANER

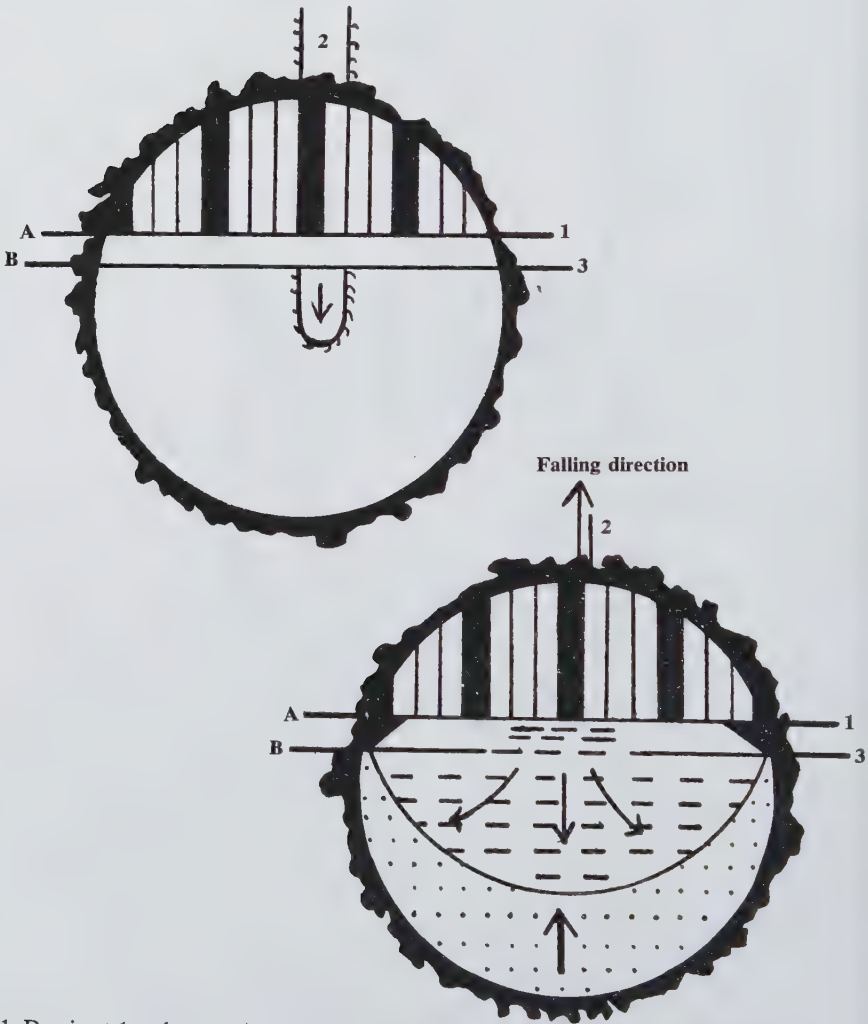


1. Dog in at 1 and cut to A. 2. Dog in at 2 and cut to B. 3. Dog in at 3 and cut to C. 4. Dog in at 4 and cut the remaining portion.

one side, then the other as shown. The corners should be nipped as in the previous method. The final cut is across the back, as you would in backcutting any tree.

The third method of backcutting a heavy leaner is boring the face. (Refer to Illustration 52). After the face has been sawn and removed,

ILLUSTRATION 52
BORING THE FACE OF THE HEAVY HEAD LEANER



1. Dog in at 1 and cut to A. 2. Bore in the face at 2 and cut the center section as shown. 3. Nip the corners. 4. Dog in at 3 and cut the remaining portion.

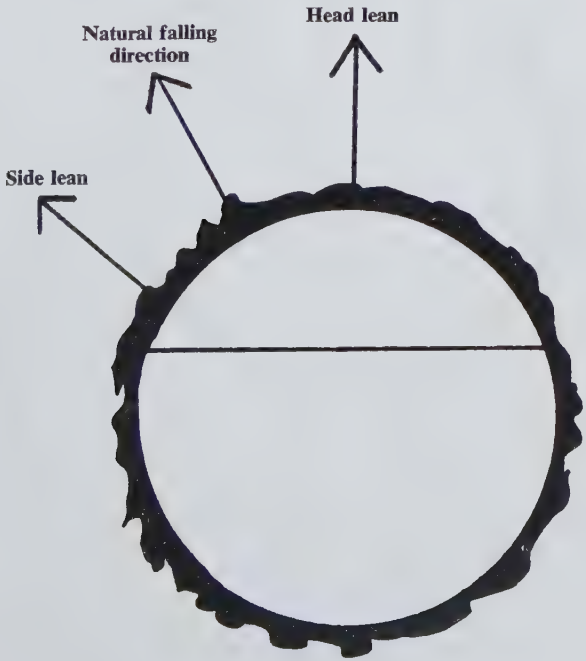
insert the bar as shown. The cut should be from the center of the face to one side, then across to the other side. Be certain that you leave several inches of wood remaining all around the tree. The final back-cutting step is across the back. Although the face-boring method of backcutting can be used effectively, it is the least desirable of the three methods. This results mainly from the consideration that the tree is leaning heavily. If the cut proceeds too close to the back, the tree could sit down on the bar and/or barber-chair.

The function of these three methods of backcutting is to remove a portion of the center section of the wood to expedite the backcut before the tree has a chance to barber-chair. All of these three types of backcuts will assist the faller in handling heavily leaning trees. Which method is best is dependent on the situation and the faller involved. Each method is valuable because the portion of uncut wood is reduced. Less tensioned wood to cut through means less chances of a barber-chair occurring.

HEAVY HEAD LEAN WITH A SLIGHT SIDE LEAN

A second type of leaner is one in which the head lean is toward the lead with a slight side lean across the lead. (Refer to Illustration 53). A tree in this situation is faced in the lead or desired direction.

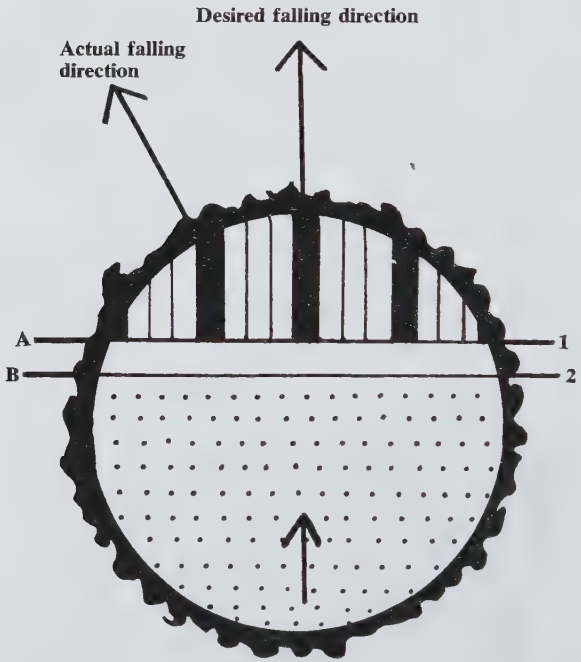
ILLUSTRATION 53
HEAVY HEAD LEAN WITH A SLIGHT SIDE LEAN



As in the previous example, the face is deeper and larger than usual. Although any of the three methods of backcutting can be used, side-boring is perhaps the most effective. Fallers generally prefer the side-boring method because he has better control of the holding wood. But side-boring is not enough to keep the tree in the lead.

If the tree is felled without considering the side lean, it will not fall where intended but where the side lean takes it. (Refer to Illustration 54). Therefore, the normal amount of holding wood left com-

ILLUSTRATION 54
RESULT OF NOT COMPENSATING FOR SIDE LEAN

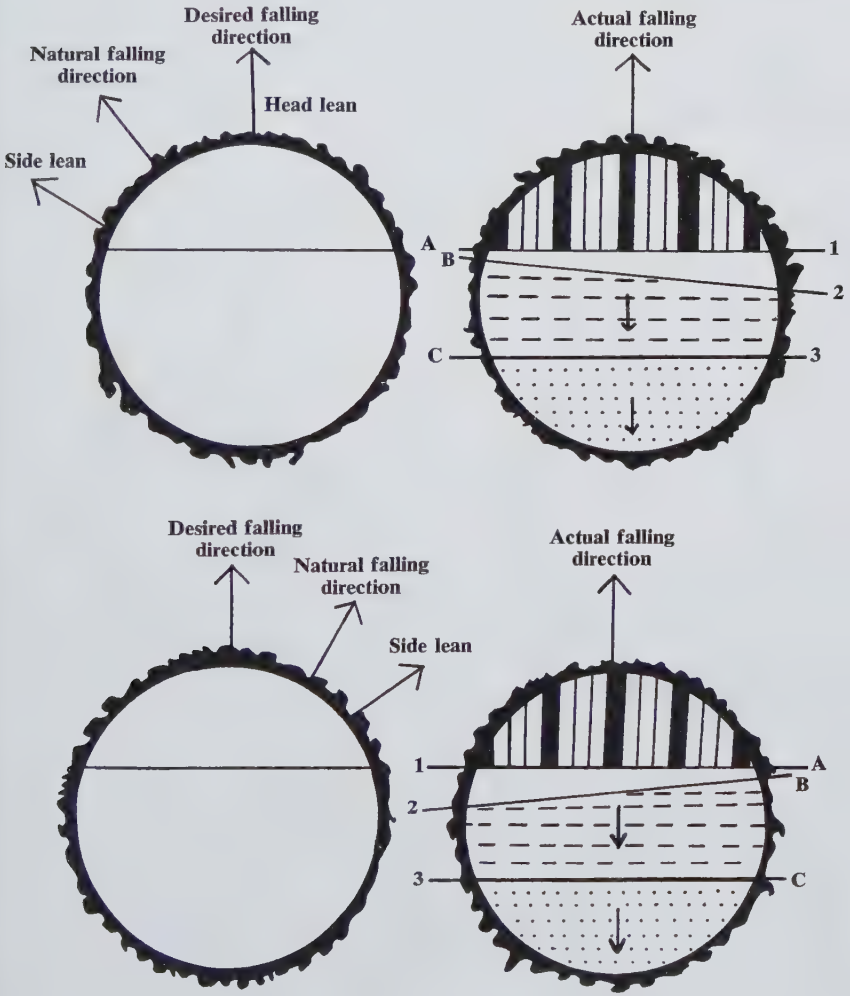


pletely across the stump must be altered. The holding wood on the lean side is narrower than on the other. This forces the lean side holding wood to break off sooner than the wider holding wood side. The result is that the tree will pull away from the side lean. Consequently, two special techniques are used to fall a heavy leaner that has a head lean in line with the lead and a side lean crossing the lead.

The application and procedure of these two special techniques when falling such a tree will now be examined. (Refer to illustration 55).

ILLUSTRATION 55

SIDE-BORING AND MANIPULATION OF THE HOLDING WOOD TO FALL A HEAVY HEAD LEANER WITH A SLIGHT SIDE LEAN.

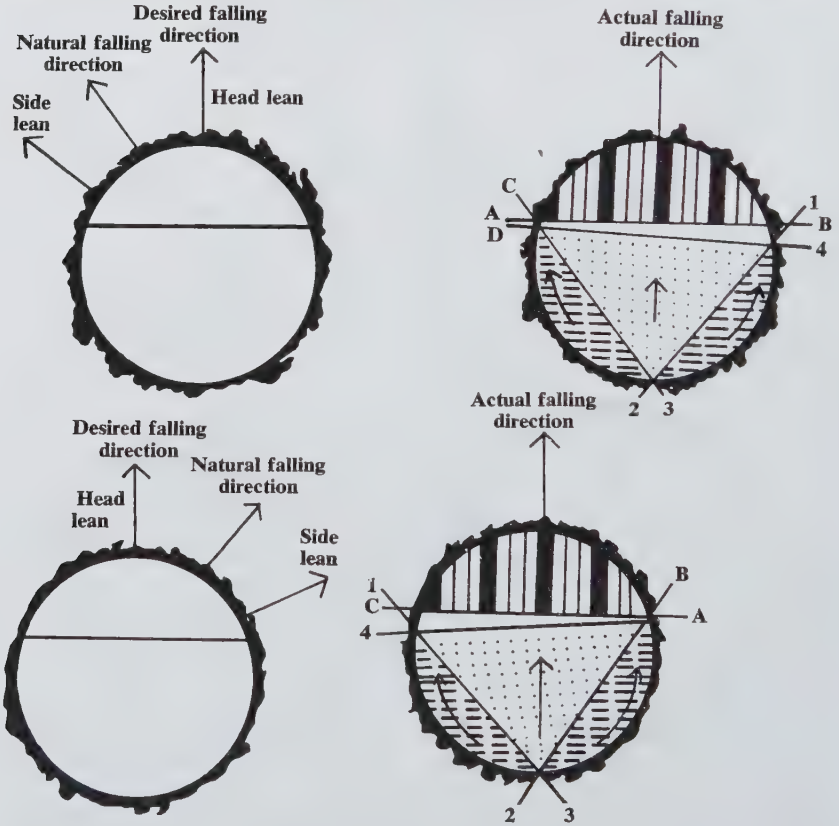


1. Dog in at 1 and cut to A. 2. Dog in at 2 and cut to B. Notice the cutting direction is away from the face. 3. Dog in at 3 and cut to C then out the back.

Remove a large face on the side of the intended falling direction. Go to the offside and begin side-boring. Realizing the side-lean is to this side, it is understood that only a narrow strip of holding wood is required. Therefore, the side-boring cuts off the area shown. Now side-bore the other side making sure a substantially wider margin of holding wood remains on the "pull" side. The final cut severs the remaining wood at the back of the tree. In effect, two special alterations of the normal falling procedure have been used to solve a particular problem. The side-boring backcutting method has prevented the heavy head lean from causing a barber-chair. Alteration of the amount of holding wood maintained across the stump has dealt with the side-lean. The side-notching method is another effective technique for handling this tree. (Refer to Illustration 56).

ILLUSTRATION 56

SIDE-NOTCHING AND MANIPULATION OF HOLDING WOOD TO FALL A HEAVY HEAD LEANER WITH A SLIGHT SIDE LEAN.

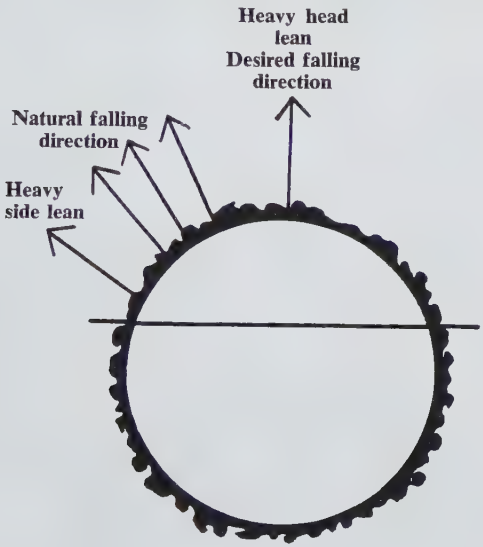


1. Dog in at 1 and cut to A. 2. Dog in at 2 and cut to B. 3. Dog in at 3 and cut to C. 4. Dog in at 4 and cut the remaining wood. Nip the corners is necessary.

LEANERS WITH A HEAVY HEAD AND HEAVY SIDE LEAN

The third type of leaner that will be encountered is one having both a heavy head and side lean. (Refer to Illustration 57). Again,

ILLUSTRATION 57
LEANER WITH A HEAVY HEAD LEAN AND A HEAVY SIDE LEAN



the problem of utilizing timber by maintaining a lead is presented. It is apparent that some drastic alteration of standard falling technique is needed. This drastic alteration is commonly referred to as the Dutchman. But besides having to contend with the tree it is also necessary to contend with the Dutchman itself. It seems as though every faller has his own interpretation of what constitutes a Dutchman. For the purpose of this example, two basic types of Dutchmen will be defined as the Swing Dutchman and the Step Dutchman. Variations of the technique used here will be shown in the accompanying illustrations. It will be noted that variations in technique result from the amount of holding wood remaining. Basically the use of a Dutchman is an attempt by the faller to redistribute the weight of a tree from its actual leaning direction to the desired direction. It is obvious that if a tree with a heavy head and side lean is to be kept in the lead, that some type of weight redistribution is mandatory. The Swing Dutchman is one method of accomplishing this task.

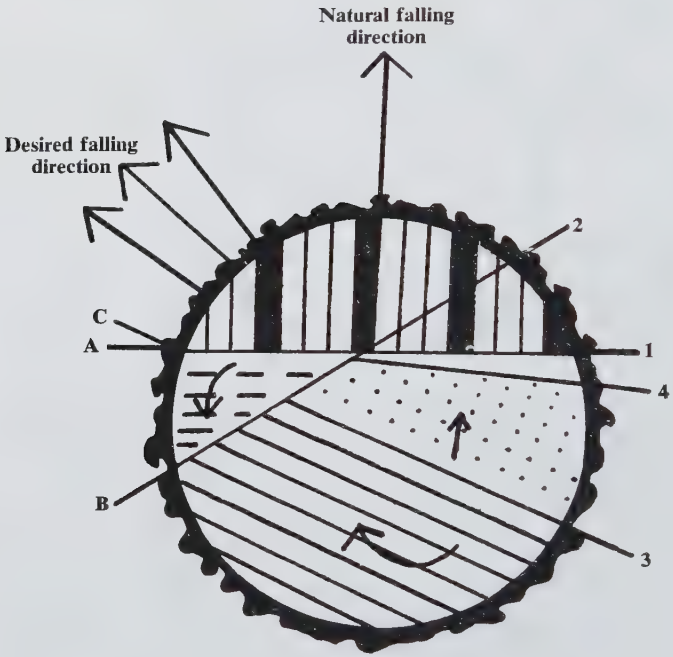
SWING DUTCHMAN

In the previous example the variations resulting from the slight side lean could be compensated for by the manipulation of the holding wood. In this example, the side lean is too prominent for the manipula-

tion of holding wood to compensate for. The Swing Dutchman also makes use of altering the holding wood but in a drastic manner. Another technique is also needed. This technique can best be explained in the following example. (Refer to Illustration 58). Face the tree in the desired

ILLUSTRATION 58

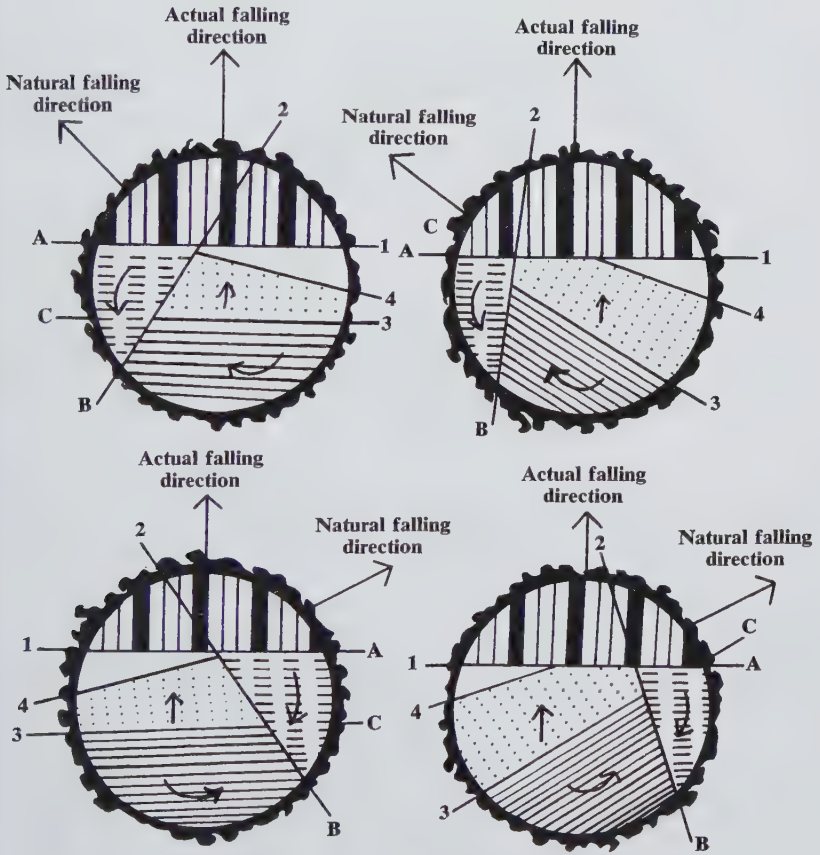
SWING DUTCHMAN — AN EFFECTIVE METHOD OF HANDLING THE HEAVY HEAD AND HEAVY SIDE LEANER.



1. Dog in at 1 and cut to A. 2. Dog in at 2 and cut to B. 3. Dog in at 3 and cut to C. 4. Dog in at 4 and cut the remaining portion.

direction with a large deep face opening. Continue the horizontal cut of the face several inches past the intersection of the sloping cut. At this point, many variations occur in the amount of wood severed and the positioning of the bar. Some of these variations are shown in Illustration 59. Regardless of the amount of wood being severed, the intention is

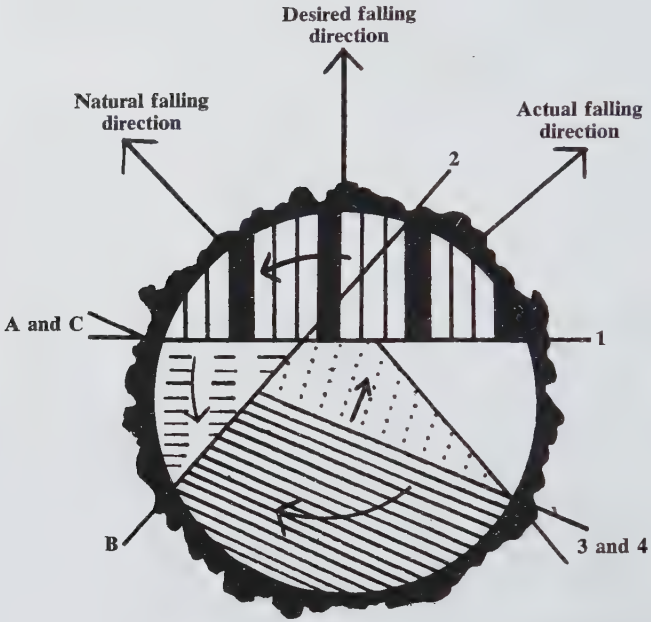
ILLUSTRATION 59
VARIATIONS OF THE SWING DUTCHMAN

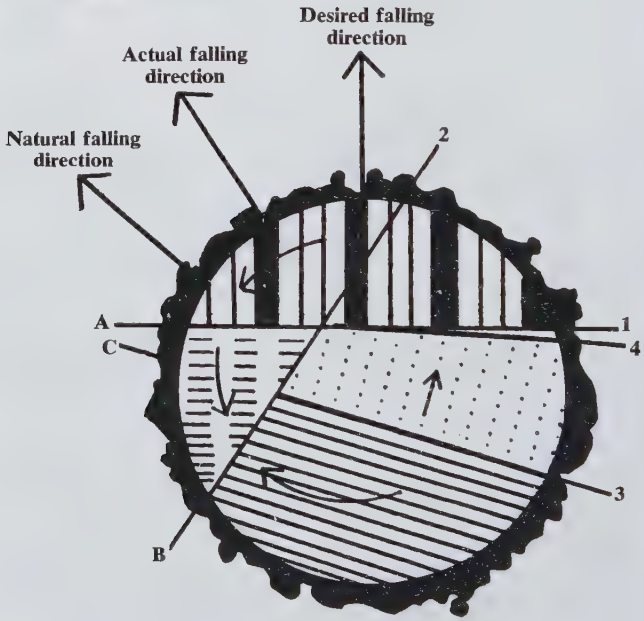


the same. The holding wood on the lean side should be severed prior to the final backcutting step. The removal of the face and holding wood on the offside reduces the amount of remaining holding wood substantially.

As the final backcut proceeds, the tree will naturally move in the direction of the side lean force. In doing so, the kerf of the Dutchman

ILLUSTRATION 60
MISUSE OF THE SWING DUTCHMAN





closes. A point is reached where the remaining holding wood will not allow the tree to fall any further toward the side lean. At this point, the side lean, having no holding wood to secure it to the stump, begins to swing or pivot toward the face. Therefore, the technique of changing the direction of the tree is merely a matter of redistributing the weight of the tree from the side to the desired direction. The secret of the Swing Dutchman is not in the technique involved, but in determining when and how much of the remaining holding wood should be cut. As stated, a point is reached when the tree is not allowed to fall any further to the side. The change of weight and therefore direction swings the tree to the holding side. How far it continues to pivot depends on how much securing wood remains, and how long during the swing it is left. If too much wood remains, the tree may swing far across the intended lay. If the holding wood is severed too quickly, the Dutchman effect is lost and the tree will fall across the lead to the lean side. (Refer to Illustration 60).

In this particular instance the problem of the heavy leaner has been solved. A combination of four special techniques were involved in its solution; manipulation of the front holding wood, insertion of the Swing Dutchman, the cutting off of the majority of the backcut area prior to the tree beginning to fall, and the final decision of when and how much of the remaining wood should be cut. The Swing Dutchman can be used effectively with either the Conventional or Humboldt face. The technique and resulting effect will be substantially the same.

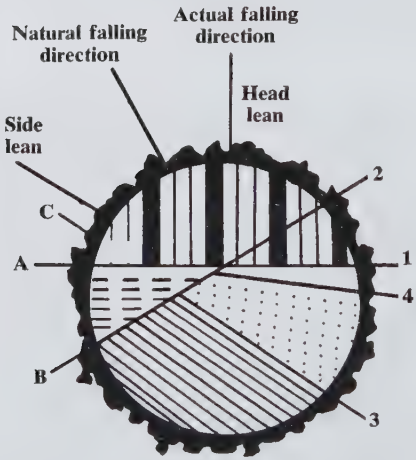
STEP DUTCHMAN

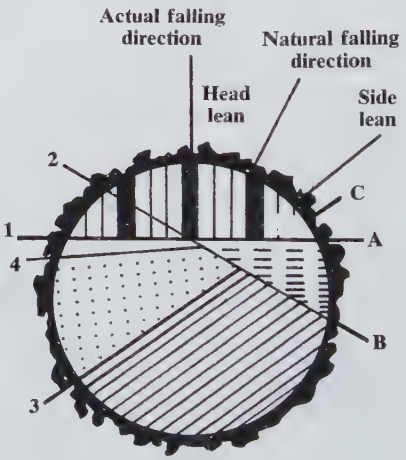
A second method of handling a tree with excessive head and side lean, is the Step Dutchman. Basically, there are two techniques commonly used to establish a Step Dutchman. The difference in technique results from the two different faces commonly used. In the Conventional face the step effect of the Dutchman is easily obtained. In this type of face the bottom cut of the face is horizontal while the top cut is sloping. The step effect is instituted by placing a piece of wood or a rock in the face in the lean side corner. (Refer to Illustration 61).

The standard Humboldt face however, is generally not used in association with the Step Dutchman. The nature of the sloping bottom cut cannot support an object for a step. Therefore, the Humboldt face must be altered. (Refer to Illustration 61). The horizontal cut of the face is sawn in the normal manner, but the sloping cut is altered and a series of cuts are required. The first cut of the bottom cut is the width of the chain saw bar below the top cut. It should continue until the same depth of the top cut is achieved. The next cut is vertical. Stand beside the tree and bore in with the tip of the bar at the position where the two previous cuts will meet. This section must be removed by the use of an axe. The third facing cut's depth should be far enough to allow a wide-mouthed face opening. This cut should be approxi-

ILLUSTRATION 61

STEP DUTCHMAN — AN EFFECTIVE METHOD OF HANDLING A HEAVY HEAD AND HEAVY SIDE LEANER.





Dogging sequence: (A) 1 to A; (B) 2 to B.

1. Dog in at 1 and cut to A.
2. Dog in at 2 and cut to B.
3. Place the step in the face.
4. Dog in at 3 and cut to C.
5. Dog in at 4 and cut the remaining wood.

mately ½ the depth of the second. Again, insert the bar and bore across the stump. Remove this section. Now a rock or piece of wood can be placed in the face. Obviously, the alteration of the Humboldt face to use a Step Dutchman is quite a process. Nevertheless, either method of facing will produce the same effect.

Regardless of which face is being used, the horizontal cut is sawn past the sloping cut. How far it extends depends upon the severity of the side lean and how far the tree's direction must be changed. After the horizontal cut has been extended, and the face removed, a rock or piece of wood is placed in the face on the lean side. The last cut is the backcut. Variations in depth and dogging sequence are, as the extended horizontal cut, dependant on the severity of the side lean and how far the tree's direction must be altered to keep it in the lead. Either side-boring or side-notching, as with the Swing Dutchman, can be used to deal with the head lean. As the final backcut proceeds, the tree's natural movement is toward the lean side. The only difference between the effect of the Swing Dutchman and the Step Dutchman occurs when the pivoting tree sits on the Step Dutchman. The step accentuates the pivoting motion much faster than in the Swing Dutchman.

Either of these two types of Dutchmen enable the faller to handle a particular problem tree. Both types alter the basic amount of holding wood, while at the same time are distorting the standard backcutting procedure. The manipulation of holding wood and the variation of backcutting, effectively deal with problems of excessive head and side lean.

Before considering the next topic it is necessary to comment about the use of either type of Dutchman. The Dutchman, Swing or Step, has received criticism from some fallers and support from others. The basis for the argument against the Dutchman is that many times control of the tree is lost. Arguments in favor of its use stem from the fact that standard falling procedure doesn't allow for heavy side leaners. This writer is inclined to favor the use of both Dutchmen. If a faller cannot use a special falling technique, like the Dutchman, when he is confronted with a particular problem tree, he is forced into a decision. He must either fall the tree where its natural forces take it, or leave it. In the first case, control of the tree can be maintained but only in the direction of the heavy side lean. Considerations to the lead, breakage, and safety cannot be dealt with. In the second instance, in which the leaner is left standing, another series of problems arise. If the felled trees are skidded and then the leaner felled, inefficiency results. After completing the strip, the faller goes on to the next area to be cut. Later, when the area is skidded, a faller must be brought back to fall the tree. Also, what happens if the tree leans directly over a stump, ridge or rocks, or some other object that would break it? If only standard falling technique can be used, the obvious result would be breakage and consequentially loss of merchantable timber. It seems rather illogical to break

the tree when the reason it wasn't felled to begin with was that it could not be controlled.

It is not the Dutchman that is ineffective but the manner in which it is applied and executed. Either of the two basic types of the Dutchman, if used properly, are effective techniques for the handling of special problem trees. The Dutchman, as the tree itself, cannot initiate action by itself. It only responds to the forces put in effect by the faller. If the faller understands and properly executes the required technique, the response of both the Dutchman and leaner can be anticipated.

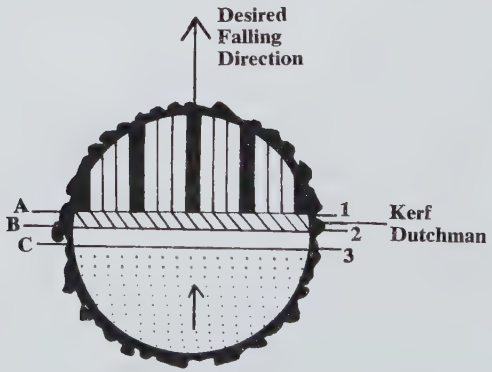
Therefore, the problem of the Dutchman is not in its use, but in its misuse. To one degree or another, many trees are improperly felled because either the Dutchman was misused, or its use was unintentional. Observation of the stumps of trees that have not fallen where they were desired proves this statement. Many times the stump reveals an unintentional Swing Dutchman. The problem is that either the faller didn't take the time to check the face to see if the Swing Dutchman was present, or he did not realize what effect it would have on the tree. Hopefully, the point has been made. The two basic types of Dutchmen are special falling techniques essential for the handling of the special problem tree, the heavy leaner. It is its unintended use and/or misuse that renders it ineffective.

KERF DUTCHMAN

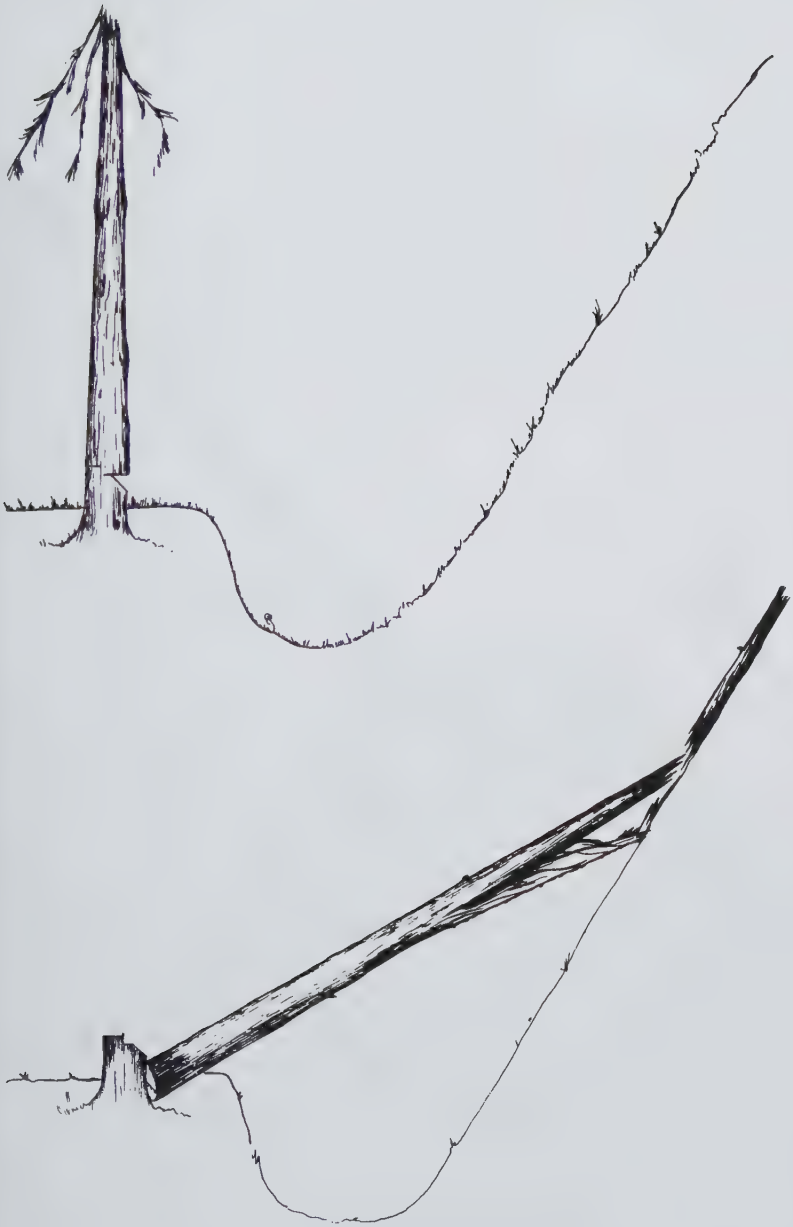
While on the topic of the Dutchman, reference will be made to a third type of Dutchman. In this book, the third type of Dutchman is called the Kerf Dutchman. It will be recalled that under the chapter on Improper Facing, one of the examples used involved the unintentional sawing of the horizontal cut past the intersection of the sloping cut completely across the stump. (Refer to Illustration 62). As stated, the

ILLUSTRATION 62

KERF DUTCHMAN — AN EFFECTIVE METHOD OF HANDLING A PARTICULAR PROBLEM TREE.



1. Dog in at 1 and cut to A. 2. Dog in at 2 and cut to B. 3. Dog in at 3 and cut to C.



Results of improper technique

Proper technique

misuse or unintended use of the Dutchman causes problems. Applied with understanding, as the Swing and Step Dutchman, it is effective in solving a particular falling situation. As stated, the Kerf Dutchman is a face within a face. Being the width of the chain, it closes immediately as the tree falls forward. If the proper amount of holding wood is cut, the tree, as it continues forward, will tear or break it off. Unrestricted by holding wood, the tree will not fall into the face, but jump forward off of the stump. Of the three Dutchmen, the Kerf Dutchman provides the least control over the tree. At times, however, its application may be needed. In the following example, the Kerf Dutchman has an application. (Refer to Illustration 62). In this case, the faller is presented with a problem of only being able to fall a tree in a specific direction. If the tree is felled straight ahead, the ridge will cause substantial breakage. Falling to either side will cross the established lead. Therefore, the faller is forced to fall the tree straight away. If he can make the tree jump off of the stump over the embankment, the lay area will support the tree from unnecessary breakage. The application of the Kerf Dutchman is only in very restricted situations. It is when the faller encounters such a situation that the value of this special technique is realized.

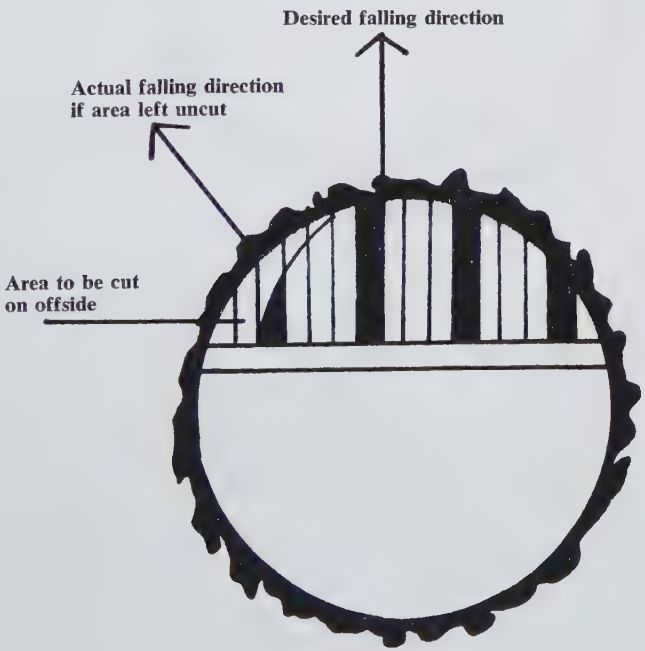
CHAPTER VI

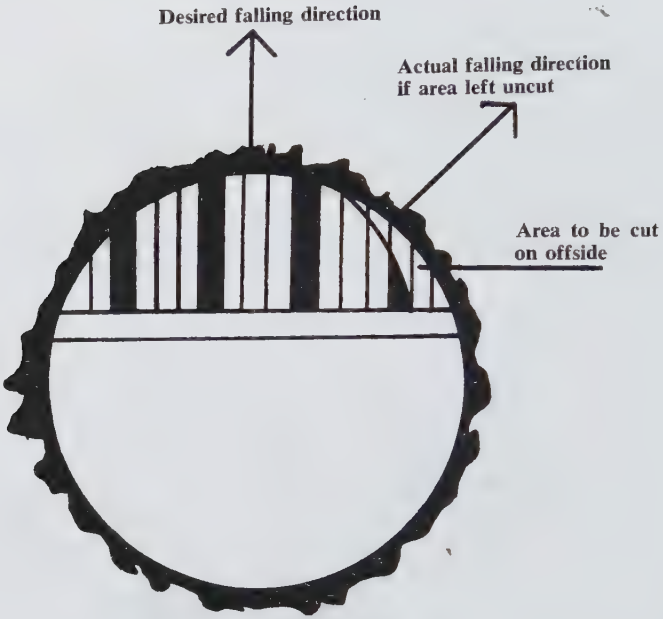
FALLING LARGE TREES

The procedure for falling a large tree is slightly different than that used for smaller ones. The major problems involved are that the bar is not long enough to reach completely across the stump, and the faller is not able to cut up the holding wood quickly enough to prevent loss of control and/or a barber-chair.

If a tree is so large that the bar cannot reach completely across the stump while facing, you can go to the offside and continue the two face-forming cuts. (Refer to Illustration 63). Face the tree as you would

ILLUSTRATION 63

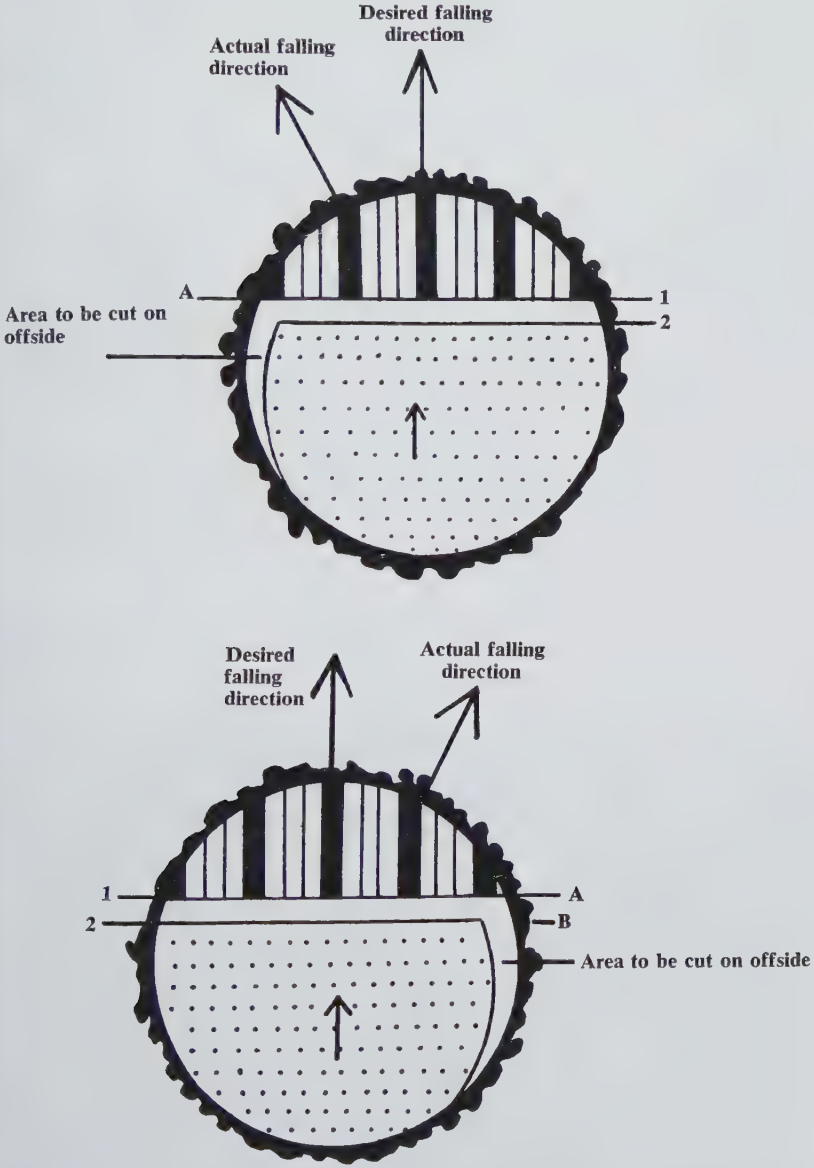




FACING A LARGE TREE — If the bar is not long enough to cut completely across the stump, the faller must go to that side and finish the cut. If this procedure is not followed, the tree will fall to the "extra" holding wood side.

any other tree. The undercut cannot be removed because the two facing cuts have not met on the offside. At this point remove your saw and proceed to the area in front of the tree where the two cuts end. Insert your bar into the horizontal cut and continue it to the desired location. Then lengthen the remaining cut to a point where it meets but not crosses the other. Now the face can be removed easily. After removing the face the attentions of the faller are shifted to the backcut. The large tree may create a problem in the backcutting stage because the bar may not be long enough to cut all of the holding wood at once. And this can have disastrous effects. Two of the obvious effects are loss of control of the tree and/or a barber-chair. The large tree won't fall where you intend because on one side the holding wood is cut, while the other side is only partially cut. (Refer to Illustration 64). As the tree lifts off the stump, the holding wood secures it to the stump and helps direct its fall. As the tree closes the face, the holding wood breaks off. But the narrow strip of extra holding wood on the offside momentarily holds that side on the stump longer than usual. The result is that the tree will swing to the extra holding wood side. Generally slabbing, and/or root

ILLUSTRATION 64



BACKCUTTING A LARGE TREE — Notice the uncut portion in each illustration. If these portions remain uncut, the tree will follow the actual falling direction arrows. The side-boring, side-notching, or boring-the-face methods of backcutting are effective methods of handling this situation.

pulling is also associated with not being able to cut off all of the holding wood completely across the stump. The immediate as well as potential dangers of a lost tree have previously been mentioned. Control of a tree is essential. Be aware of this situation. Always closely observe the offside to see if the backcut has reached completely across the tree. If it has not reached completely across, go to that side and cut it out. If your bar is not long enough to reach across the tree, use the side-boring, side-notching, or face-boring method of backcutting.

The second major result of not cutting, or not being able to cut, all of the holding wood at once is a barber-chair. This statement does not include the cutting off of the holding wood, however, immediately behind the face. This holding wood, directly behind the face, should never be cut completely off. After facing the large tree, the faller begins the backcut. As the holding wood is being cut up the tree gradually moves toward the face. If the holding wood is not cut up fast enough to keep up with the constantly forward motion of the tree, it will generally barber-chair. (Refer to Illustration 65). The best method of preventing

ILLUSTRATION 65

BARBER-CHAIR — RESULTS WHEN THE BACKCUT DOES NOT PROCEED QUICKLY ENOUGH.

the barber-chair is to use either the side-boring backcut, the side-notching backcut, or the face-boring method. Removing portions of the wood prior to initiating the final backcut reduces the amount of wood remaining to be cut. This decreased remainder of wood can be severed quickly. Quickly cutting off the remaining wood virtually eliminates the possibility of a barber-chair occurring.

Therefore, when falling large trees, it may be necessary to complete the face on the offside. Do not reduce the size of the face so that all of the facing procedure can be done on one side. It may also be necessary, depending on the size of the tree, to use the side-boring, side-notching or face-boring method of backcutting.

If the lean of a large tree has been incorrectly established, it will sit back. If wedges have been inserted into the backcut, as they should be, and driven in tightly, the tree will be prevented from falling over backwards. The faller must now redistribute the tree's weight from the backcut area to the face. This transfer of weight can be accomplished with the use of a heavy driving maul and thick, steel, lifting wedges. However, if the lean is severe, the best method of forcing the sit-back tree to the intended direction is with the use of a hydraulic jack. Bore in the back of the tree beneath the backcut as shown in Illustration 66. Insert the jack and gradually lift the tree. Be sure that the accompanying wedges are driven periodically to maintain an even lift completely across the stump.

ILLUSTRATION 66

REDISTRIBUTING THE WEIGHT OF A LARGE TREE WITH THE USE OF A HYDRAULIC JACK.

Sawing the jack hole.

Removing the block

Redistributing the tree's weight to the face. Notice the accompanying wedges.

The tree is properly committed to the face.

This is a result of cutting a springboard notch beneath the holding wood.

CHAPTER VII

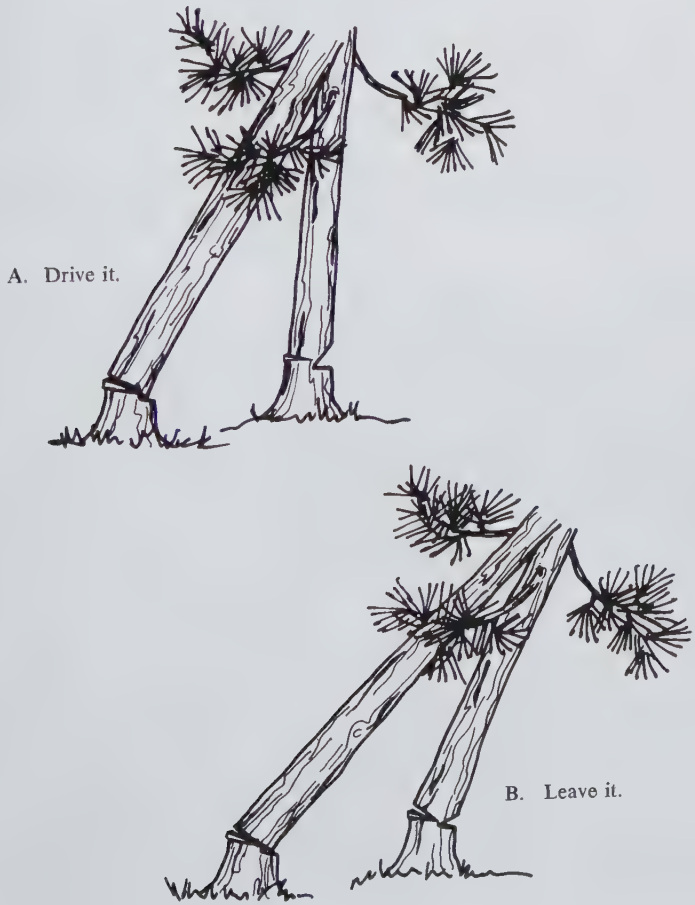
OTHER COMMON PROBLEM TREES

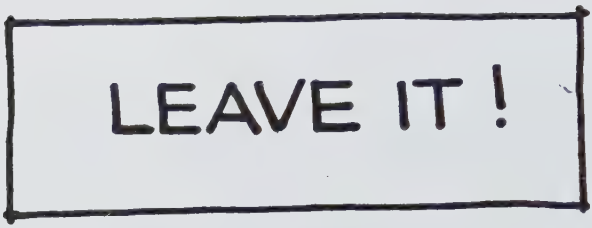
HANG-UPS

Hang-ups are another common problem the faller encounters. A hang-up refers to the tree that is being felled, hanging up in another tree, or a tree that blows over and is hung in another.

The best means of handling this situation is to pick out a tree and fall it into the hang-up. All of the procedures of falling should be followed when falling a driving tree. In most cases a hang-up can be dislodged by the use of a driver. (Refer to Illustration 67). If the

ILLUSTRATION 67
METHODS OF HANDLING A HANG-UP





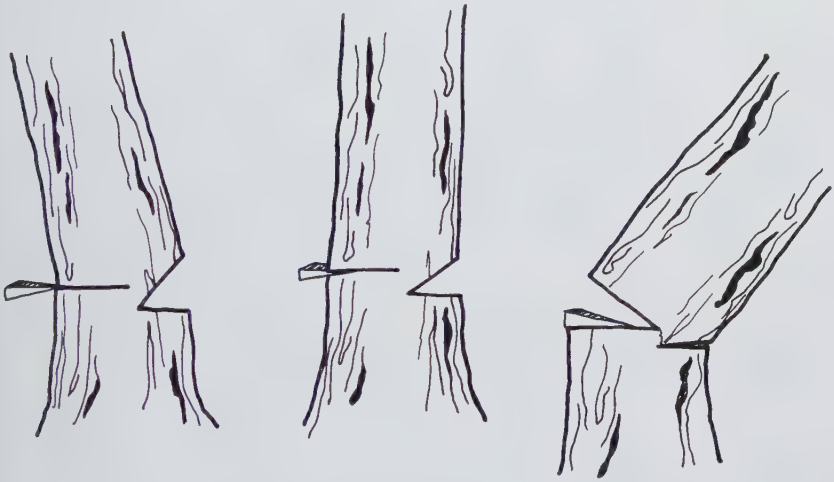
driving tree fails to dislodge the hang-up, and no other driving tree is available, the faller should stop his work and report the situation to his fellow workmen and his supervisor. Under no circumstances should he (the faller) attempt to fall the supporting tree. The dangers involved are numerous. While attempting to fall the supporting tree, its top, or the top of the hang-up, could snap out. A widow maker could be dislodged, or the wind could blow the hang-up down. Or, perhaps, the faller manages to face the supporting tree, but as soon as he attempts the backcut the tree barber-chairs and both trees fall on him.

Under no circumstances should the faller work in the immediate area of a hang-up. In such cases the final option is the removal of the danger tree through means of powder and/or equipment.

SIT-BACK

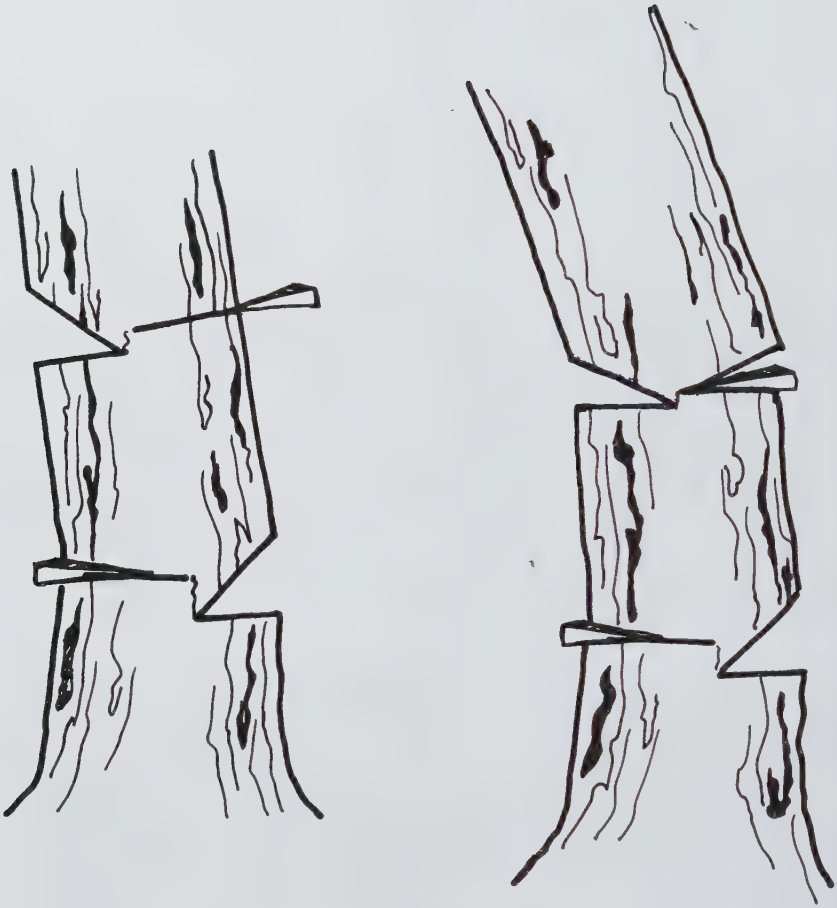
Sit-back refers to a situation in which a tree fails to fall in the intended direction and instead settles back. The procedure for handling a large tree which has "sat-back" has been previously discussed. This process of sitting-back closes the backcut. If the faller has adhered to correct procedure, enough holding wood will remain to keep the tree from coming over backwards. Also, if he has followed the procedure of placing a wedge in the backcut as soon as possible, he can almost always pull the bar out. But, if he hasn't inserted a wedge or cannot pull his bar out he must enlist the assistance of another faller. Assuming that he can retrieve his bar, the faller must give first consideration to picking out another escape route. Now he has several options. (1) He can attempt, with the use of wedges, to lift the tree back to the intended falling direction. (Refer to Illustration 68). If the faller elects to wedge the tree over he must be cautious of dislodging dead or loose limbs from above, a caution which should be followed during any wedging situation. When wedging, the faller should chop the bark away from the area where the wedges will be placed. If the bark is not removed, very little, if any, lift can be obtained. The bark merely absorbs the lifting pressure. Also, the use of two or more wedges, driven alternately, can accelerate the lifting process. Driving one wedge takes the pressure off the other. So, in driving the wedges alternately, the tree can be lifted easier. (2) If sufficient lift cannot be obtained, he may leave the wedges in the

ILLUSTRATION 68
METHODS OF HANDLING A SIT-BACK



A. Wedge it.

B. Drive it.



C. Backfall it.

LEAVE IT !

D. Leave it.

backcut, and pick out a driving tree to push it over. If this method is selected, consideration must be given that the initial tree does not blow over, or tear out the remaining holding wood. Also, the driving tree may not make direct contact and therefore only brush the tree which is sitting-back. In this last situation the slight force of the driver may only rock the sit-back, giving it enough momentum to finish tearing out the holding wood, and once that holding wood is torn out, the tree can fall in any direction. (3) The tree that is sitting-back can be felled backwards if efforts of wedging or driving it over fail. In this situation the faller must reface the tree. The undercut must now be placed in the direction that the tree is now leaning. He should be extremely careful for the tree could fall at any time. Consequently the faller should plan another escape route. The second undercut should be higher up the stump from the first face. The distance between the two faces should be approximately the diameter of the tree. It should be felled in the same manner as any other tree, but with added caution. The final option left open to the faller is that of leaving the tree and immediately notifying fellow workmen and his supervisor.

It is difficult to suggest which of the options is the best method of dealing with the sit-back tree. Any of the suggested methods are effective and safe if used properly. Which is best depends on the circumstances of the situation.

The object of this step-by-step availability of options is to impress upon fallers, experienced or not, that more than one solution is possible. To leave a tree and report it is no reflection on one's ability or competency as a faller. Many good fallers have encountered this exact situation. Some have gone ahead and either wedged, driven or backfelled the tree and have done so without incident. But other good fallers are now dead or crippled because they failed to recognize or use this last alternative — leave it and report it. Removal by powder and/or equipment makes the process much safer.

SNAGS

Falling snags presents the faller with a particularly dangerous situation. Annually, many deaths are attributed directly or indirectly to the falling of snags. Special attention is therefore in order. On approaching a snag the faller must consider the following before he proceeds:

1. Swampout loose or obstructive materials from around the base of tree.
2. Establish the lean of the snag by axe or plumb-bob.
3. Give special attention to your escape route; plan it carefully for your life depends on it.
4. Closely observe the snag to see if loose limbs (widow-makers) are lodged anywhere.
5. If bark is still attached to the snag, remove it by prying it off with your axe. Make it a habit not to chop the bark off because the vibration may cause the bark to quickly slough off on top

of you; or the vibration may be enough to cause the snag to fall on its own; or vibration of the chopping may result in the snag breaking off anywhere between the stump and the top.

6. Once the bark has been removed, if any is present, closely observe the base of the snag for cracks or splits.
7. After all of these steps have been given proper attention, consider these variables in regard to the undercut. Since the snag is a dead tree it is understood that its composition is, to one degree or another, rotten. It may be sound, solid wood or merely a rind of solid wood containing loose rot. Regardless of appearance, the snag should be considered rotten and therefore extremely dangerous.
8. Realizing that the snag is rotten — note that at any time during the facing procedure it could crumble and fall. Therefore re-examine your escape route and establish an alternate one. If the snag falls on its own its actual direction is variable, therefore have more than one means of escape. Again, if the snag is rotten, it may immediately sit down on your bar as soon as you attempt to face it. Before initiating the undercut, the area must is sound enough to face. As a rule, the face of the snag should be tested to establish the location of the good or sound wood. Watch the cut carefully, assuming for this example, the snag is sound enough to face. As a rule, the face of the snag should be larger than that of a green tree. The opening of the face should be correspondingly large. Once the face has been sawn and removed, check that it is completely cleaned out. Make sure that the cuts have not crossed. If one has, enlarge the face enough to remove it. Before starting the backcut, re-examine your two routes of escape.
9. Consider these variables before the backcut is started. The snag may immediately begin to fall as soon as the backcut is started. Therefore, instead of beginning the backcut as usual, use the side-boring, or side-notching method. The face-boring method is too dangerous to use on a snag. This leaves less wood to be cut off. Either of these procedures will help prevent dangers of falling a snag.
10. As soon as the snag begins to fall, follow the same procedure as you would when falling any tree. Proceed down your escape route.

    Caution: If a snag is unusually rotten or in an excessive lean, the faller has available alternative approaches. In this situation, the best approach is to leave it and notify the appropriate people. Employee, as well as employer, benefit from safety-conscious decisions. Therefore, if you consider the snag particularly dangerous, leave it and report it.

The presence of snags among live trees to be felled presents the faller with another dangerous situation. Snags should be removed prior to cutting the area. As previously mentioned, vibration of a falling

tree or pounding of an axe can be enough to cause the snag to fall. This is especially true if its roots are decayed and rotten. Remove all snags in your working area first. Procedure to be used in falling snags should follow those guidelines already stated. Again if the snag is considered particularly or unusually unsafe, leave it and notify the appropriate people. If a snag fails to fall after it has been faced and backed up, the following procedure should be followed:

1. Fall another tree into the standing snag. However, use **special caution.** When the snag is driven it may buckle in the middle and fall back to the stump. Therefore driving a snag must be done with discretion and special alertness. Be sure to plan your escape route well and don't stop to see the action, head for cover immediately and don't stop until you are secure.
2. Do not attempt to wedge it over because the vibration of the pounding may cause the snag to fall backwards, sideways or break off.
3. Do not attempt to reface the sit-back snag or sky-bound snag. It is too dangerous.
4. If too dangerous, leave it and the snag can be removed with powder and/or equipment.

DOMINO FALLING

Domino falling is the process in which the faller faces and backs up two or more trees which he leaves standing. By the use of one driving tree, he attempts to knock all of them down at one time. (Refer to Illustration 69). It is evident that this procedure can be

ILLUSTRATION 69

DOMINO FALLING — The limbs of three trees are interwound and should be felled together. However, each one must contain sufficient holding wood and a wedge in the backcut. Notice: This technique is applicable only to special situations and should be used accordingly.

dangerous. Any one of the trees that has been faced and backed up can topple on him before he has had a chance to fall his driving tree into them. Also, after the faller has dropped his driving tree into the group, he may find that one or two of the trees still remain standing. He then is faced with falling them onto ground that already is littered with fallen trees. This can result in breakage or crossing the lead of his down trees. There is a safety problem trying to make an escape route through the already-fallen trees. Also, if any of the down trees are next to the butt of the tree he needs to fall, he may find that his face and backcut are no longer accessible. Another safety problem involved is the bucking up of his group of trees. In the first place, there will be no quick, easy escape route. If the log that you are bucking should roll or twist, you turn only to find a group of trees to climb over before you can get away. If any of these trees is in a compression-tension situation, which is highly likely, it can snap or roll towards you once the buck is completed. With nowhere to go, you can be pinned between your trees. However, domino falling can be a useful means of falling a stand of trees in a certain situation. If the limbs of a group of trees are wound around each other, or tied up together, these trees should be felled together. In this situation where domino falling must be used, the faller should drive wedges in all his trees to prevent them from sitting-back, and maintain sufficient holding wood to secure them to the stump. But where domino falling is necessary, the faller must exercise **extra caution** in a situation where trees are faced, backed up and ready to go. As suggested, falling more than one tree at once is not considered standard procedure. As in the case of the three types of Dutchmen, the application of domino falling is appropriate only in special circumstances. Problems arise when special falling techniques are misused or unintentionally used.

Before considering the next topic I feel it necessary to comment again about an alternative that each faller must be aware of. Up to this point a variety of sizes, types and situations of trees the faller commonly encounters have been dealt with. In each instance, the correct technical procedure has been given conscientious consideration. And yet the final option left open to the faller, although mentioned, must be given renewed emphasis. This final option is leaving the tree standing and seeking the advice and assistance of others. Seeking the advice of another faller or perhaps a bullbuck, if he is qualified to assist, is an option each faller should not only be aware of but use. If after conscientious consideration, a tree is deemed too dangerous to fall, other alternatives such as blowing it down with powder or pulling it down with equipment can be used. Never should a tree considered particularly dangerous be felled.

CHAPTER VIII

FALLING SAFETY

Thus far, the techniques and procedures of the professional faller have been examined, which Mr. Paul LeRoy states ". . . if followed at all times will provide for the safety of the workmen and others in the area." He concludes that, ". . . safety and efficiency are synonymous." This chapter is devoted to the task of explaining the safety features of procedural falling, and whose responsibility safety is.

The attitude toward safety depends basically on whether the viewer is an employer or an employee. The employer may only adhere to mandatory regulations imposed upon him, or he may initiate regulations and programs which excel those required. Many employers realize that it is the effectiveness of his employees that ultimately determines his success or failure. It is suggested here that although the employer has a definite effect on the measures of safety that his employees use, that it is the employee who establishes the degree of adherence and effectiveness of safety programs. Although this statement may not be true in other industries, it certainly is in the case of the timber faller. Regardless of the safety regulations placed on the faller, it is he that ultimately controls how well and how effective safety programs are. Pre-set rules may be effective in providing him with broad general guidelines, but they cannot possibly deal with every situation he may encounter. It is the multitude of constantly changing combinations of variables that the faller commonly encounters that necessitates an alteration or breach in establishing safety policy. For these reasons it is suggested that the faller must become his own safety man. Yet, the problem of realistically defining and applying the term of safety as it relates to the total job that the faller is required to do must be discussed. The proper technique of falling can reduce, but not eliminate, the need for safety precautions. Proper falling technique and correct safety procedures are both facets of the same goal — that the faller work safely as well as efficiently. The following examples will confirm this statement.

Let us assume that you have entered a strip and have picked out a tree to be felled. Precautions are taken to swampout around the tree to implement a safe sawing and wedging area. The top of the tree has been checked for loose limbs or chunks, and that no tree is leaning into the one you are falling. You have correctly established the lean of the tree to be felled and prepared an adequate route of escape. The face you have sawn is at least ⅓ the depth of the tree's diameter and the opening is large enough to control the tree nearly to the ground. It is level and the two face-forming cuts have not crossed. A warning is given to those who may be in the area. The backcut is level and 2 inches above the horizontal cut of the face. As soon as room is available, a wedge is inserted into the backcut kerf. A single-bitted axe is used to drive the wedge. The backcut continues until, by inspection, the desired amount of holding wood remains completely across the stump. As the tree lifts, you immediately proceed along the predetermined escape route which

is back and to one side. The tree has fallen exactly where intended. But something is wrong. The tree has been broken off about 40 feet from the butt. Observation reveals that an old stump was hidden beneath some brush directly in line with where you had faced the tree. Unable to do anything about it, you buck the tree into logs, utilizing as much as possible. While in the process of measuring, you are startled by a crashing object immediately behind you. The vibration of your tree hitting the ground has caused a snag to fall. Thankful that the snag missed, you proceed to the next tree to be felled. Again, the precautions are taken prior to falling the tree, but this time you can't find a place to fall it except directly across one of the good logs remaining from the first tree felled.

Let's stop at this point and analyze this situation. The correct procedure was observed, in part, and neglected, in part. Before the tree was felled, the area should have been examined to determine the best way the trees could be felled in relation to themselves and the terrain. In this situation, the second tree has no place to go except directly across one of the remaining good logs left from the tree previously felled. As suggested on page 41, it is the first tree felled on a strip that determines the direction the remaining trees will fall. Now, further breakage is unavoidable, not only in this tree, but in the ones to follow. Another breach in procedure results from the faller not checking out his intended lay. Because he didn't, the old stump remained hidden and resulted in the loss of merchantable timber by breakage. Another breach in procedure might have cost the life of the faller. Failure of the faller to determine if any snags were in the immediate vicinity, and fall any that were, is an important step and must not be omitted. Therefore, we have a situation in which most of the procedure was followed and done properly; the procedure that was not followed turned out to be costly. Obviously it could have been more costly to the faller if the snag had taken his life.

Let us assume that the faller has taken the lay of the land into account and thereby established a strip layout. He has observed and felled a snag that posed a possible threat to this continued work in the area. The lean of the tree to be felled has been determined, and its intended lay walked out. It has been properly swamped out and wedges and an axe are readily available. The tree has been properly faced and backed up. The tree lifts off the stump but does not fall in the intended direction but sideways. The faller turns to run, but instead of being able to quickly escape along an established route he attempts to force his way through a thicket.

At this point let us again analyze what has happened, and what the result is. Again, part of the falling procedure was adhered to and part neglected. The area was observed for terrain and a predetermined method of falling established. The tree was swamped out properly, axe and wedges were handy, and a proper face and backcut sawn. The faller neglected to do two things. He failed to check for a tree leaning into the one he was falling, and he did not establish an escape route. With

another tree leaning into its top, the tree being felled will not fall where it is intended. The force of the snag's weight breaks off the holding wood on one side. The felled tree goes directly over another tree and breaks. The log it falls on also breaks. This creates a situation in which the following trees will be broken because they will have to be felled across it, and having no predetermined route of escape, the faller is trapped at the stump, and his safety jeopardized. He can be injured or killed by the snag falling on him, by the tree's butt kicking back over the stump and hitting him, or by widow-makers. Again, some aspects of procedure were adhered to and some were not.

In the following paragraph you will find another case where the procedural format is not followed. Let us assume, for the sake of this example, that considerations were given to the terrain, strip layout, snags, the tree's lean and the intended falling lay. The faller starts his saw and approaches the tree. Before reaching the tree, he steps on an old limb. Losing his balance, the faller instinctively put a hand down to break his fall. The chain, being in the position it is, will come in contact with the faller's hand before the ground does. In another instance perhaps the area around the tree has been swamped out, but the faller neglected to remove a sapling from the offside facing corner. As the face is being sawn, the nose of the bar touches the sapling and a kickback results. Or, perhaps loose debris had been removed, as well as saplings or brush, in the facing area. The faller properly faces and backs up the tree, but he has not established the correct lean and the tree sits back. If the proper falling technique had been used, wedges would have been inserted into the backcut to prevent the tree from falling over backwards. The faller attempts to redistribute the tree's weight so it will fall in the intended direction. Using a single-bitted axe, he attempts to drive the wedges into the backcut. But as he swings the axe toward the wedges, its direction is altered by some nearby brush. If the area around the tree is not cleaned out, the faller will be unable to set his wedges. He faces the possibility of a tree sitting back and coming off the stump backwards. In this instance, failure to properly swampout the working area has compromised the safety of the faller.

Hopefully, the continuation of examples is not needed to impress upon the reader that adherence to procedure is essential. Each step in the procedure of falling has a specific function, and although each step has a function, its usefulness is hindered, if not eliminated, if some of the steps are not properly executed, or omitted. Each step, although essential, is a facet of the total required safety procedure; correct safety procedure is a facet of the total falling procedure. Safety procedure cannot, by itself, compensate for poor falling technique. Conversely, proper falling technique cannot, by itself, compensate for improper safety procedure. It is the combination of correct safety procedure and proper falling mechanics that constitutes an effective professional faller. A step-by-step approach to falling is essential not only for the safety of the faller, but for efficient utilization of the product. Chapter III has established a procedural approach to falling in which the variables

encountered by the faller, at any particular point of the falling sequence, can be identified and dealt with.

Instead of being concerned with **all** of the situations of danger at once, the faller can isolate those of concern at any particular point in his sequence. This is a useful approach. It also gives him a sense of order to the process of falling. It is a breach in procedure, a step left out, a warning not considered, that causes safety and utilization problems.

CHAPTER IX

GENERAL BUCKING PROCEDURE

Bucking refers to the cutting of a tree into sections called logs. These logs are bucked or cut at specific lengths according to species, grade and end use. Trees cut into logs facilitate skidding to the deck, loading, and transport to the mill. Bucking is the second major responsibility of the faller. Numerous fallers have been killed and injured while performing this essential duty. The following procedure will help assist the efforts of the faller when he is bucking a tree into logs.

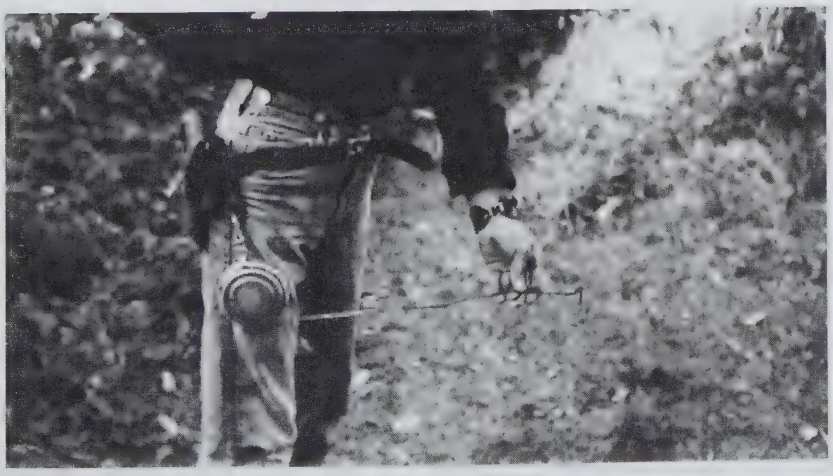
To establish a sequence of activities, let us regress back for a moment to the point when the tree is being felled. As the tree lifts off the stump, the faller travels his previously arranged escape route. After the tree hits the ground, the faller makes his way back to the stump. At this point the faller's concern shifts from falling technique and safety, to bucking technique and safety. The following suggested procedure should be considered before bucking begins.

First of all, closely observe nearby trees. This is especially important if the felled tree has brushed them and caused loose debris, commonly referred to as widow-makers. The faller may now concern himself with bucking the tree.

THE TAPE

Fallers use measuring tapes to establish the exact location where the tree is to be bucked into logs. Generally, the tape is a thin metal strip encased in a spring-loaded carrier. (Refer to Illustration 70). Located

ILLUSTRATION 70
LOGGER'S TAPE



Stinger

at the end of the tape is a stinger. A stinger is a sharp, metal nail-like affair which, when pushed into the tree, secures the end of the tape so that the faller can walk out and establish the exact bucking location.

One of the problems involved in inaccurate log lengths is that the faller fails to remove cut limbs and debris from the tree being measured. (Refer to Illustration 71). In such a case the desired length and actual length may be as much as a foot different. Another cause of inaccurate log lengths result from the faller not cutting at the desired spot. The faller may cut exactly where he wants but it is not in the correct location. After establishing where the cut should be, the faller scratches the spot with his calk boot. He gets off the tree into the bucking position and has a three to five inch choice of where he thinks the correct location is. This random choice could be eliminated by the faller's use of a lumber marker. If the exact bucking spot is established and marked before the faller gets off the tree, he can swampout the bucking area, refuel his saw, or a number of other things without losing the location. Another contributor to inaccurate log lengths is the use of spliced tapes. Many fallers will, after breaking their tape, splice it together. If properly spliced, the tape will measure as accurately as a new one, but the problem is that a splice is generally done incorrectly. To avoid mismeasuring logs because of an inaccurate tape, never splice them. Instead, replace broken tapes with new ones. To insure accurate measurement of logs the faller should make sure the tape is not hung up on debris,

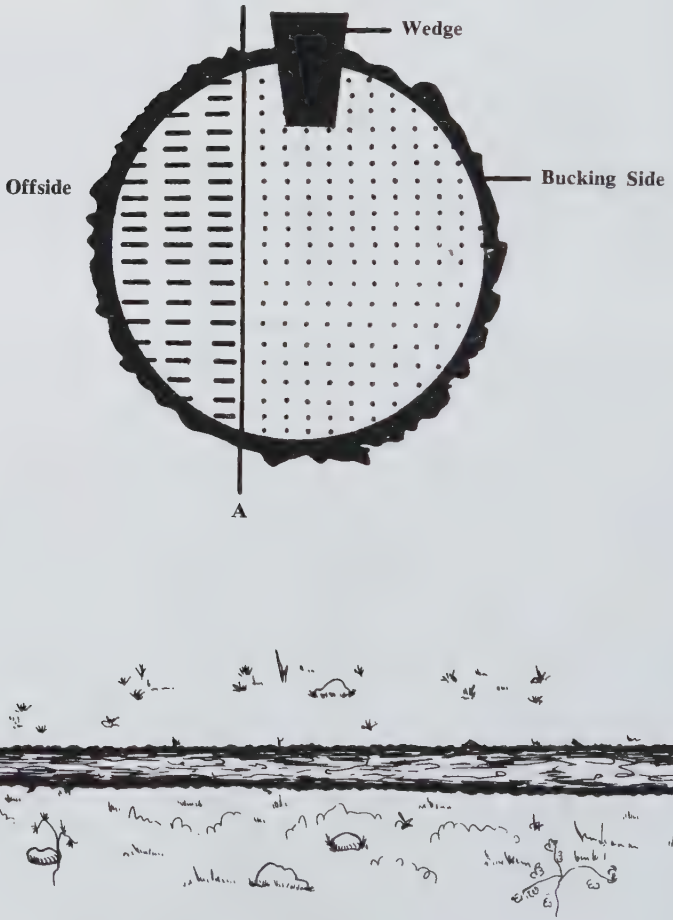
ILLUSTRATION 71

INACCURATE LOG LENGTHS — Notice that the tape is elevated.

that the exact length is established and marked, and that spliced tapes are not used.

Now the faller is ready to buck the tree. He places the stinger of his tape in the cut and proceeds down the tree to the desired length. The faller must now consider the best and safest way to buck. He again checks to make sure no loose debris is above him. The tree is lying flat on the ground and not against another tree. He is now ready to concern himself with bucking technique. (Refer to Illustration 72). After remov-

ILLUSTRATION 72
BUCKING A TREE THAT IS LAYING FLAT



ing all loose paraphernalia from underfoot to secure his footing, he is ready to begin. The faller places the bar of his saw at a right angle to the tree, stands to one side of the saw, and begins cutting. Standing to one side of the saw prevents injuries if the saw should kick back. Firmly gripping the handle bar, fingers hooked over and thumb under, the faller continues his cut downward. As soon as room permits, a wedge is inserted in the cut to prevent possible pinching of the bar once the log is completely sawn off. Be sure that the log is completely sawn off to prevent an unpredicted roll which could injure you, or later on, a member of the rigging crew. After the faller climbs back upon the tree and places the stinger in the cut, he continues down the tree to the next bucking location. The same procedure is applicable. The result is a tree which has been bucked into appropriate lengths, ready to be skidded to the deck for stacking.

This bucking example was chosen because it represents an ideal situation. Such situations are not common and are therefore not totally reflective of what you will face in everyday work. The value of the example is not only in its procedural approach but also in its intent. If all trees were in this exact situation, further discussion would be unnecessary. But they are not and therefore let us consider possible variations.

The major force the faller must be aware of while bucking is bind. To one degree or another, bind is involved in virtually every bucking situation. Bind is a dominant factor because of the natural unevenness of land formations, and presence of stumps, windfalls or other objects that prevent the tree from lying flat. To effectively deal with bind on a daily basis, it is necessary to understand what comprises bind. When a bind occurs, two different pressure points result. Compression is one, tension is the other. In order to buck safely, the faller must be able to accurately determine where each force is in play, and to what extent each contributes to the bind as a whole. The following examples will display bind in trees lying in different positions.

BOTTOM BIND — TENSIONED TOP, COMPRESSED BOTTOM

Notice the position of this tree. (Refer to Illustration 73). The butt

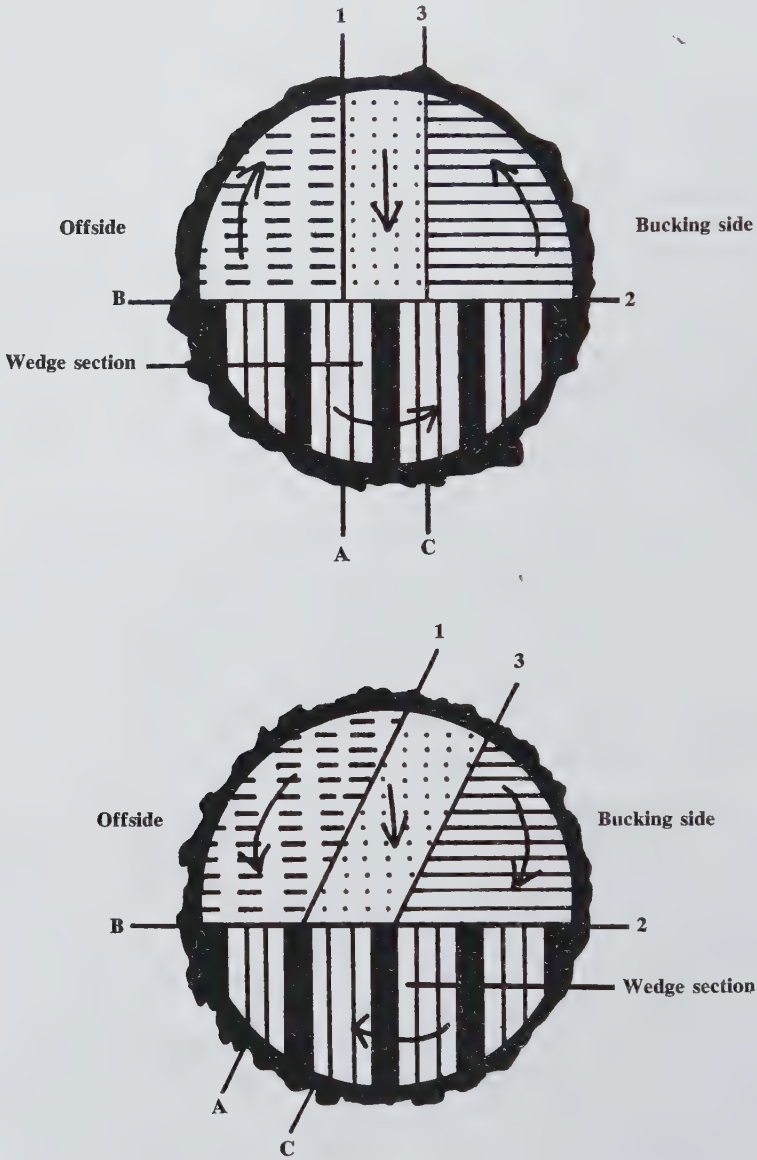
ILLUSTRATION 73
POSITION OF A TREE IN A BOTTOM BIND SITUATION

is suspended in the air. In this particular instance, the overhanging section of the tree exerts pressure at two particular points. The overhang creates pressure from the top of the tree downward, resulting in tension at the top and compression at the bottom. To clarify and further illustrate this important point, a pliable substance will replace the non-pliable tree. Take a piece of children's silly putty and roll it into a pencil-like form. Place it across an object to stimulate the position of the tree described above. You will notice that the overhanging end will gradually move downward. Closer observation reveals that the top of the substance moves downward while the bottom bulges from the downward pressure exerted on it. These movements result because the overhanging end transfers normal "across the tree holding power" to the upper side. This holding wood change results in another transfer. This compressed wood, bulging from downward pressure on each side, attempts to equalize itself by moving upward toward the vacated tensioned area. The faller must be aware of these forces for safety, as well as utilization purposes.

If a tree in this position is bucked from the top straight down, the result will be the creation of a long, lateral split. As the saw chain cuts downward, tension is released. As tension is released it increases the compression pressure on the bottom. This drastically increased compression pushes upward. The long, lateral split occurs because the upward compression pressure pushes up much faster than the saw chain can cut downward. In order to avoid splitting the tree previously mentioned, the following procedure should be followed.

First, make sure no dangerous materials are overhead. Next, position yourself on the uphill side. Swampout the bucking area to promote firm footing. Realizing that the tree's bind creates tension on the top and compression on the bottom, the following sequence of cuts should be used. (Refer to Illustration 74). Establish the exact measured length desired. Dog in and cut the offside as shown. Next, visually project this bucking location around to the bottom of your tree. At this point on the bottom, underbuck and cut a wedge out. The purpose of the wedge is to give the downward tension a place to go and therefore reduce the upward pushing compression. After removing the wedge section, cut the near side as shown. Retrieve the saw and sever the remaining wood. As shown, the final bucking cut is from the top down. Once the log is completely bucked off it will drop. Be careful that it doesn't pivot on an old stump, limb or rock, and swing around hitting you. As in falling, establish an escape route before you begin bucking.

ILLUSTRATION 74
CORRECT BUCKING SEQUENCE FOR BOTTOM BIND



1. Dog in at 1 and cut the offside to A.
2. Dog in at 2 and underbuck to B.
3. Dog in again at 2 and cut out a wedge ending at B.
4. Bore in with the end of the bar at 3 and cut to C.
5. Sever the remaining wood.

Removing a wedge section.

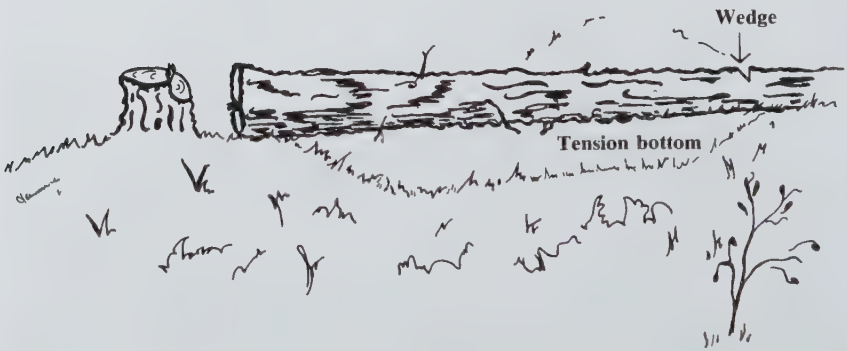
Starting the final cut.

Notice the wedge section is closing.

TOP BIND — COMPRESSED TOP, TENSIONED BOTTOM

Notice the position of the tree in Illustration 75. The butt and top are resting on solid surfaces, with a wide span of suspended middle

ILLUSTRATION 75

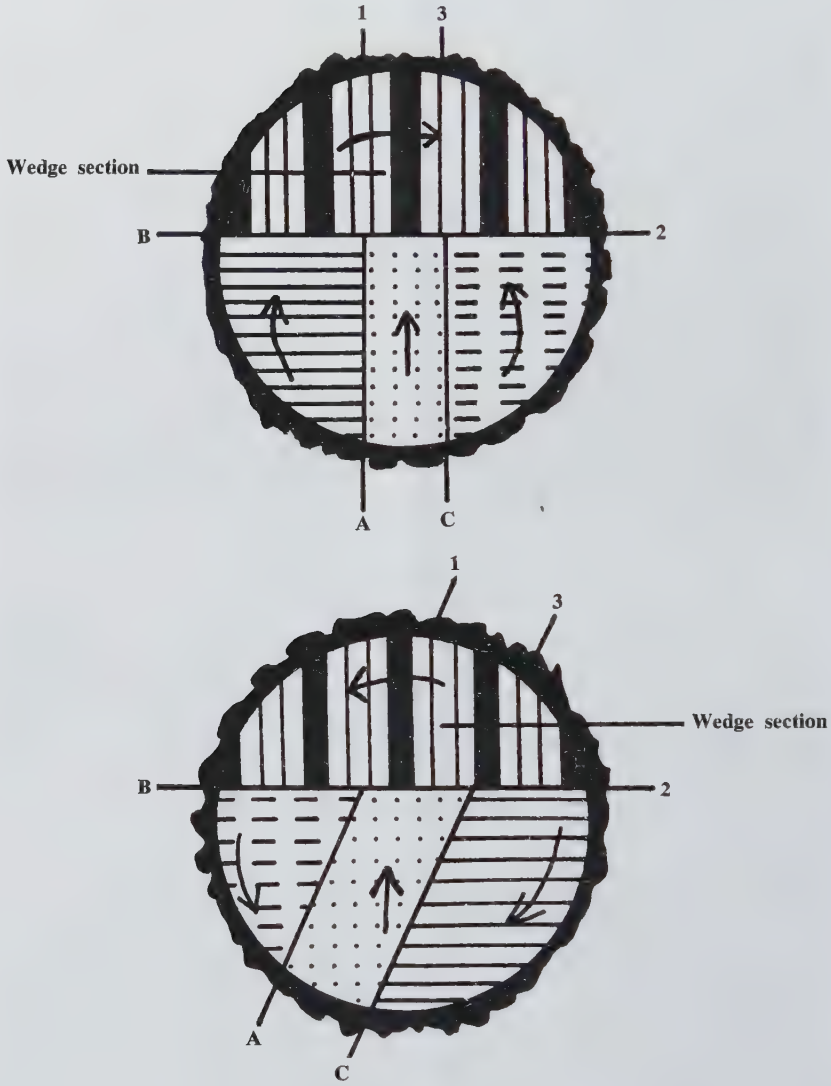


TOP BIND — Position of a tree in a top bind position.

area. In this case the concentration of tension and compression is strongest one-half way between where each end rests on the ground. The position if this tree therefore alters the relationship of the factors which comprise the bind. The distance of the unsupported portion of the tree creates a natural downward pressure, which is, in this case, compression. This downward force transfers pressure to the bottom of the tree and this results in tension. But unlike the previous example, both tension and compression pressures are downward. To clarify this reaction, let us again make use of the putty tree. Place the putty tree in a position corresponding to the actual tree position. Immediately the putty will naturally droop in the middle. Looking closely, we observe that the top or compressed portion moves downward but so does the tensioned portion. Therefore, the unsupported span of the tree results in the transfer of "across the tree supporting power" to the top section. This pressure point, or area of compression, responds by attempting to move downward. This downward pressure creates tension on the bottom side. In this case, the direction of the area under tension is in the same direction as the compression pressure, downward. The direction of bind pressures are therefore diffferent from the first example and the faller must understand them in order to buck correctly and safely.

If this tree is bucked from the top straight down, the result will be that the bar is immediately pinched. As the saw chain cuts downward, it increases compression below it as well as above it. Therefore, the following procedure should be used. Check above your position for any loose debris. If none exists, locate by use of your measuring tape the exact location of the desired length. Position yourself on the uphill side of the tree. Swampout the bucking area. Buck the tree in the following steps: 1) First, cut the side furthest from you by positioning your saw and cutting to the area suggested in the Illustration 76. 2) Next, cut a wedge from the top of the tree as illustrated, and remove it. Now cut the near side as shown. The final bucking cut will be, as shown, from the bottom of the log upwards. Again, as the tree is severed, it will drop. Make sure you have arranged an appropriate escape route.

ILLUSTRATION 76
PROPER BUCKING SEQUENCE FOR TOP BIND



1. Dog in at 1 and cut the offside to A.
2. Dog in at 2 and cut to B.
3. Dog in again at 2 and cut out a wedge ending at B.
4. Bore in at 3 and cut to C.
5. Sever the remaining wood by underbucking and cutting upward.

Cutting the offside first.

Sawing and removing the wedge.

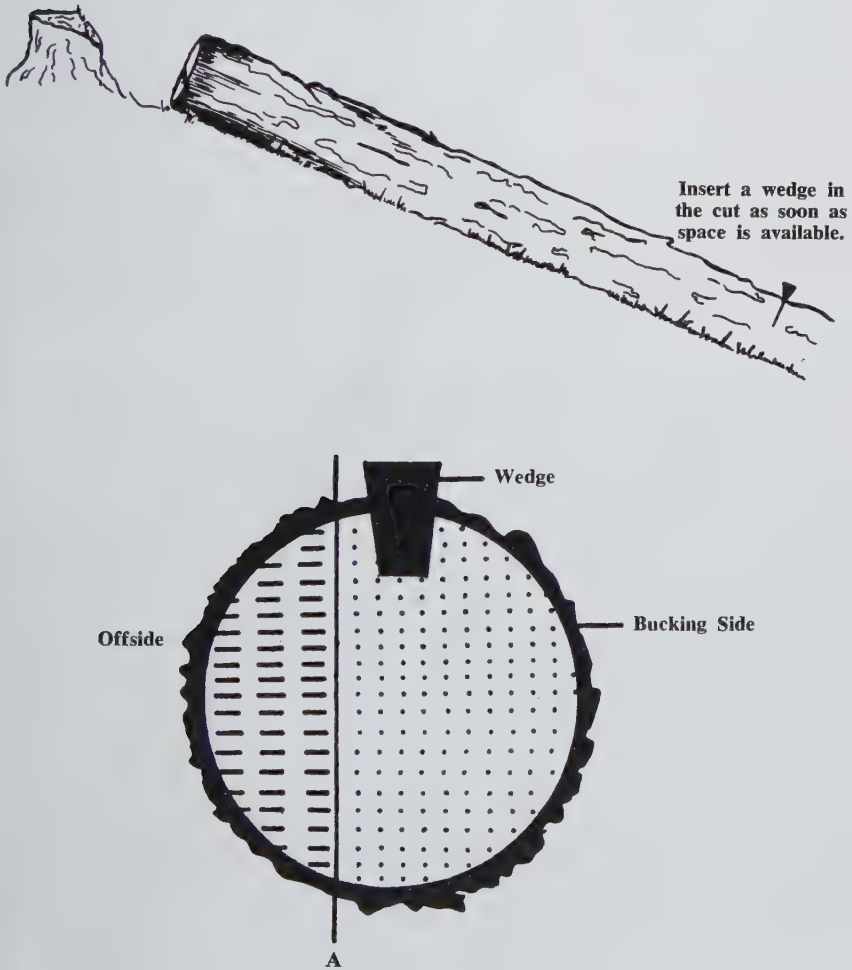
Sawing the offside first allows the faller to stand further back when the completing cut is made.

Position when the final cut is completed.

END BIND

End bind is generally a result of bucking on steep ground. (Refer to Illustration 77). As the bucking cut is completed, the upper log will slide downward closing the vacancy created by the kerf of the cut. This closing of the kerf will pinch the bar causing the saw to be hung up. The situation can easily be avoided by the insertion of a wedge prior to completing the cut.

ILLUSTRATION 77
POSITION OF A TREE IN AN END BIND SITUATION

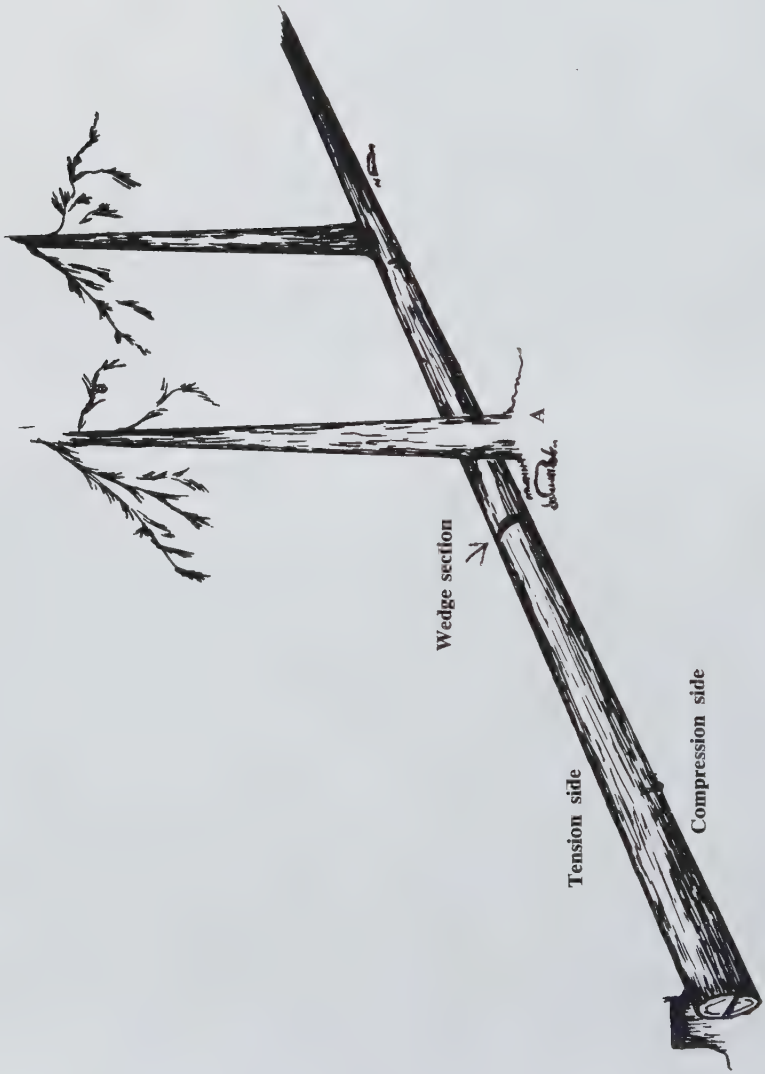


1. Cut offside first — 1 to A.
2. Begin final cut and insert wedge as soon as space is available.

SIDE BIND

Another bind the faller commonly encounters is referred to as side bind. This type of bind occurs when a fallen tree is positioned as shown in Illustration 78. As shown, your tree is against two other trees. It is

ILLUSTRATION 78
POSITION OF A TREE IN A SIDE BIND SITUATION



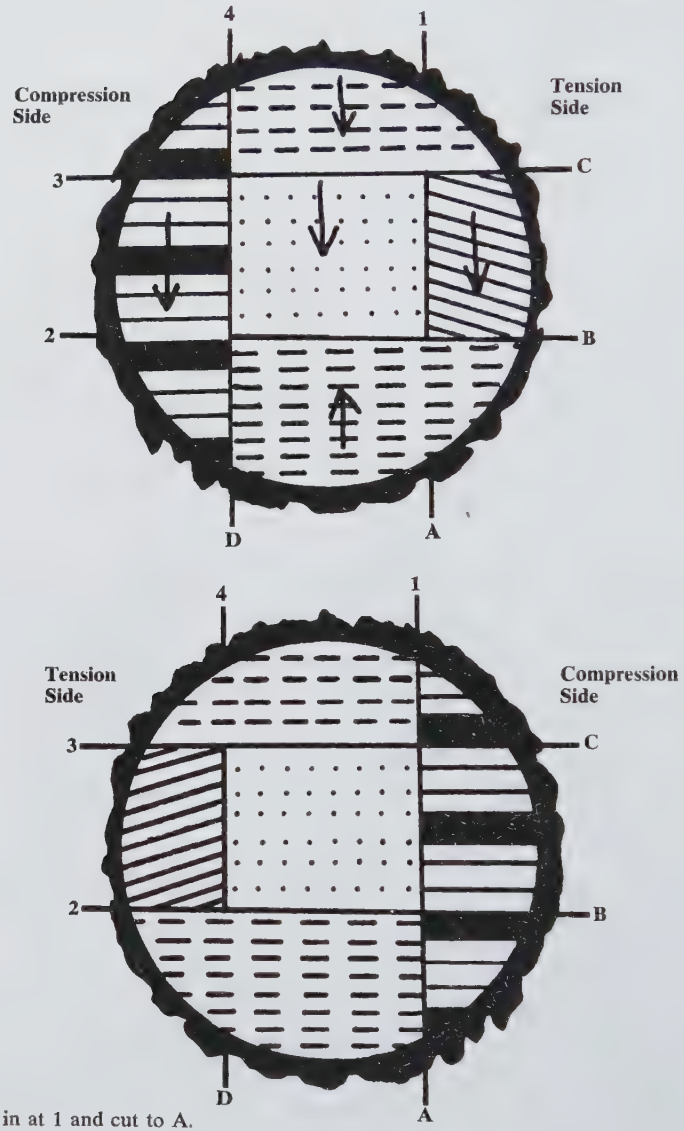
against one tree on the near side about one-half the way up, and against another tree near its top. Also, your tree's butt is against a stump. The tree is therefore bound at three points. If the bucking location is between the stump and the first tree, the following circumstances result. The bend in the tree is a consequenece of being threaded between two or more objects which are positioned in varying locations. The outward bend compresses the wood on the near side. This compression pushes toward tree A causing tension on the opposite side. Therefore, both compression and tension pressures are pushing outward or toward tree A. If this tree was bucked from the top down, the result, depending on the severity of the bend, would be that the bar would be immediately pinched. This happens because the wood cells of the compressed area are tightly pressed together. As the cut is initiated, the highly compressed wood cells rush into the area vacated by chain kerf. If the tensioned area is cut first, a lateral slab or split will occur. The stretched or elongated cells of this tension area attempt to move in the same direction as the compressed wood cells do. A cut in this area causes the stretched cells to be relieved and the compression increased. The increased pressure from the compression area results in a lateral split.

In order to buck this tree correctly, the following procedure should be used. (Refer to Illustration 79). First follow the mandatory safety procedures for bucking a tree. Check for loose materials overhead, position yourself on the uphill side, and swampout the bucking area. Special caution should be in effect while this tree is being bucked. The bend puts the tree in a position in which, after the final buck cut is completed, it will quickly attempt to straighten iself out. This snap-back or natural straightening out process is very dangerous. Conscientiously observe the various bends and possible reactions once the tree is completely severed. Many fallers have failed to consider all the variables of such a bend and have suffered serious injuries while many others have died. Be extra cautious.

Cut a wedge in the compression side as shown. This wedge gives the compressed wood a vacated area which it can move into as the following cuts are sawn. Next, underbuck as shown, then a strip of the top portion is sawn, followed by a portion of the tensioned area. The final cut will be from the top downwards. Before initiating the release cut, make sure you can quickly get away.

Therefore, five basic positions of a felled tree have been isolated. The particular qualities of each position establishes the bucking pro-

ILLUSTRATION 79
CORRECT BUCKING SEQUENCE FOR SIDE BIND



1. Dog in at 1 and cut to A.
2. Dog in again at 1 and cut out a wedge ending at A.
3. Dog in at 2 and underbuck to B.
4. Dog in at 3 and cut to C.
5. Bore in at 4 and cut to D.
6. In a downward direction, sever the remaining wood.

cedures used. And yet, it is not implied that each tree has only one of these forces in play. One or more of the tension-compression relationships can be in effect. For example, a tree can be positioned as shown in Illustration 80. It is apparent that at each buck cut a different rela-

ILLUSTRATION 80
COMBINATION OF BINDS IN THE SAME TREE

tionship between compression and tension will have to be recognized and dealt with. Consequently, closely observe each tree to be bucked at the first cut and be conscientious in your approach to the remaining ones. Correct determination of the forces in play and proper execution of technique are essentials to successful bucking.

LIMB REMOVAL

Cutting limbs from a felled tree is an important responsibility of the faller. Limbs are removed to allow the faller access to the appropriate bucking site, to minimize the amount of small tree destruction when logs are taken to the deck and to facilitate easy loading and hauling.

After the faller has felled the tree, he places his stinger in the top outer-most edge of the butt and proceeds down the tree to the measured bucking spot. Enroute he removes all limbs from both sides as well as the top. The faller should remove all limbs along the sides that he can reach. However, awkward positions created from reaching too far below or ahead should be avoided. Limbs should be cut off flush with the surface of the tree.

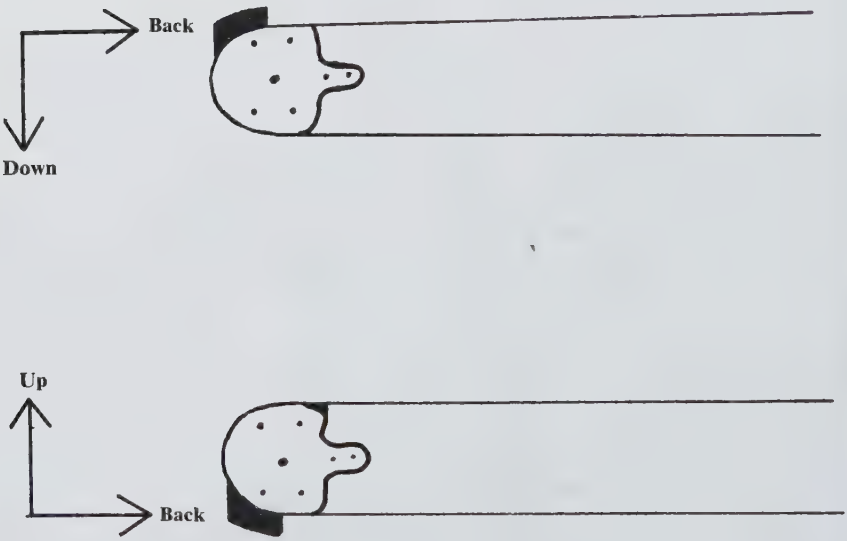
A common danger area while limbing occurs when limbs and small trees are bent under the tree to be limbed. (Refer to Illustration 81). In this example a small sapling is bent under the tree. Remembering the discussion on compression and tension, you realize that the sapling is tensioned on the bottom and compressed at the top. The natural movement will be in an upward direction. Therefore, cutting the sapling from the top down will result in its upward swing. Two major things now happen: one, the severed sapling snaps up, hitting the faller across the chest and/or face, and two, the saw is hurled back toward the faller. The possibility exists that the faller can be injured by the sapling, or by getting saw cut when he loses control of the saw. Don't be misled. The force generated by the small tree is tremendous. The best solution to such a situation is merely to leave the sapling alone. Generally, most fallers would not cut such a sapling. The complexity of the problem occurs when a sapling is cut without realizing that it's there. Many times such a sapling is present but covered by limbs or other loose debris. The faller, not realizing its presence, reaches down to remove a limb and severs the sapling at the same time. It is therefore important to make sure what in fact it is that you are cutting. Remove debris from the area to be worked up. Be sure such a danger doesn't exist.

ILLUSTRATION 81

SIDEWINDER — The danger of bent under saplings in the limbing area. This Illustration shows a sapling bent under a tree. When cut it becomes very dangerous, especially if it is covered with debris.

Another major problem of limbing results from the improper use of the bar. The most sensitive portion of the bar is the very tip. It is this area that contributes to the majority of kickbacks and saw cuts. When limbing, or anytime a saw is used, be careful not to stub your bar. If the end or nose of the bar is stubbed, the immediate response is a kickback. If the top end of the bar is touched, the saw will respond by kicking back and down. (Refer to Illustration 82). The saw will kick

ILLUSTRATION 82



KICK-BACKS — Sensitive portions of the bar. If the upper tip of the bar is touched the response will be a back and downward kick-back. A back and upward response occurs if the lower tip of the bar is touched.

back and up if the bottom tip is touched. To eliminate these two directional kickbacks while limbing, be careful not to stub the bar and be certain that the bar is committed to the desired cutting area. Also, be aware of objects lying beyond the limb. For example, you may be careful not to stub your bar, but in the process of severing the limb, touch the end of the bar on a tree or some other object beyond. Again, know where the tip of your bar is at all times and avoid contact with the nose or end.

PROPPING OF LOGS

It is essential that the propping of logs be mentioned. Propping of a log or tree refers to an attempt of a faller by the use of limbs, faces, or whatever material is available, to secure the position of an uphill log or tree. The major purpose of propping is to allow the faller to work below unsecured logs or trees. Although propping has been used for many years, its use and application are subject to some skepticism. At a glance, the use of propping is seemingly in the spirit of preventive logging safety. But is it? Consider the following variables involved when propping is used.

1. Are the propping limbs structurally sound and strong enough to keep the log from rolling?
2. Is the log to be propped exerting equal pressure on all supporting limbs?
3. Are the limbs being used to prop the log strategically positioned to achieve the necessary holding power?
4. Are the ends of the propping limbs placed into the ground secured from slipping?
5. Are the ends of the propping limbs placed onto the log in a manner in which they are secured?
6. If another tree is felled, will the vibration undermine the secure positions of the propping limbs?
7. If the log shifts, will the supporting limbs conpensate for its movements while retaining their effectiveness?

The above-mentioned variables are not all that might possibly be involved, only those most prominent. Nevertheless, the potential danger resulting from propping should be quite evident. If this potential danger is not apparent, the following possibilities may provide insight.

As a result of propping a log, with all the dangerous variables constantly present, the faller can be put in jeopardy in the following ways.

1. A rolling log can kill the faller, while he is falling or bucking a tree, by crushing him against it.
2. A rolling log, hitting the butt of a tree being felled or bucked, or the butt of a nearby tree, can dislodge limbs and/or the tops.
3. A rolling log which hits other logs may result in one pivoting around, injuring or killing the faller in the process of falling.
4. A rolling log stopping against trees to be felled results in problems of facing, backcutting, wedging and escaping.
5. A rolling log may create other problems of safety and utilization by crossing the established lead.

As you may have concluded from the above statements, the propping of logs is considered far beyond the classification of a dangerous situation. It is suggested that the propping of logs should not be done.

CHAPTER X

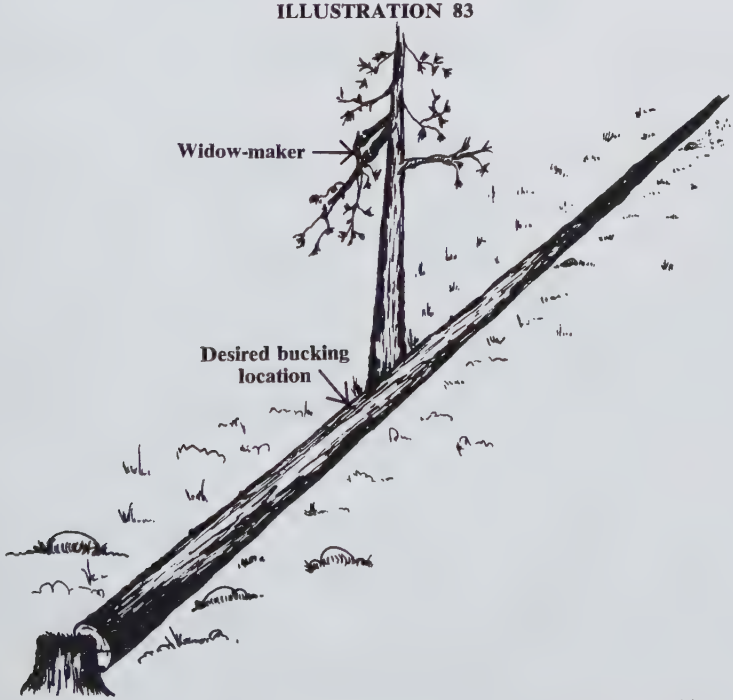
BUCKING SAFETY

As suggested in Chapter VIII, it is the faller that ultimately establishes the degree of adherence and effectiveness of safety programs. This statement is as true while bucking as it is while falling. Some general safety considerations follow.

WIDOW MAKERS

The presence of loose debris above the bucking and/or limbing area is to be avoided. Widow makers can fall at any time. The best procedure for the faller to observe is to stay out from under them. If widow makers are present, the tree can be bucked at twice the length. Or, perhaps, the tree can be bucked into a short log and a long log. (Refer to Illustration 83). Company policy should be followed in regard to the best manner of handling such a situation. But work should never be initiated or continued if loose debris is overhead.

ILLUSTRATION 83



VARIATION OF LOG LENGTHS TO AVOID WIDOW-MAKERS — Widow-makers are directly above the desired bucking location. The log could be adjusted in the following manner:

A. Buck the tree at twice the desired length.
B. Buck a short log and then a desired length log.

LAY OF THE TREE TO BE BUCKED

The position of the tree establishes the bind in play and therefore the procedure of bucking. Each cut must be examined carefully for the effects of bind. One tree may have two or more of the basic types of bind.

ESCAPE ROUTE

As in falling, an escape route should be prepared before work begins. The route should enable the faller to exit quickly and far enough to be secure. The crucial time during bucking is when the final, or release cut, is completed. Therefore, before completing the release cut, re-examine your escape route.

AWKWARD AND IMPROPER BUCKING STANCES

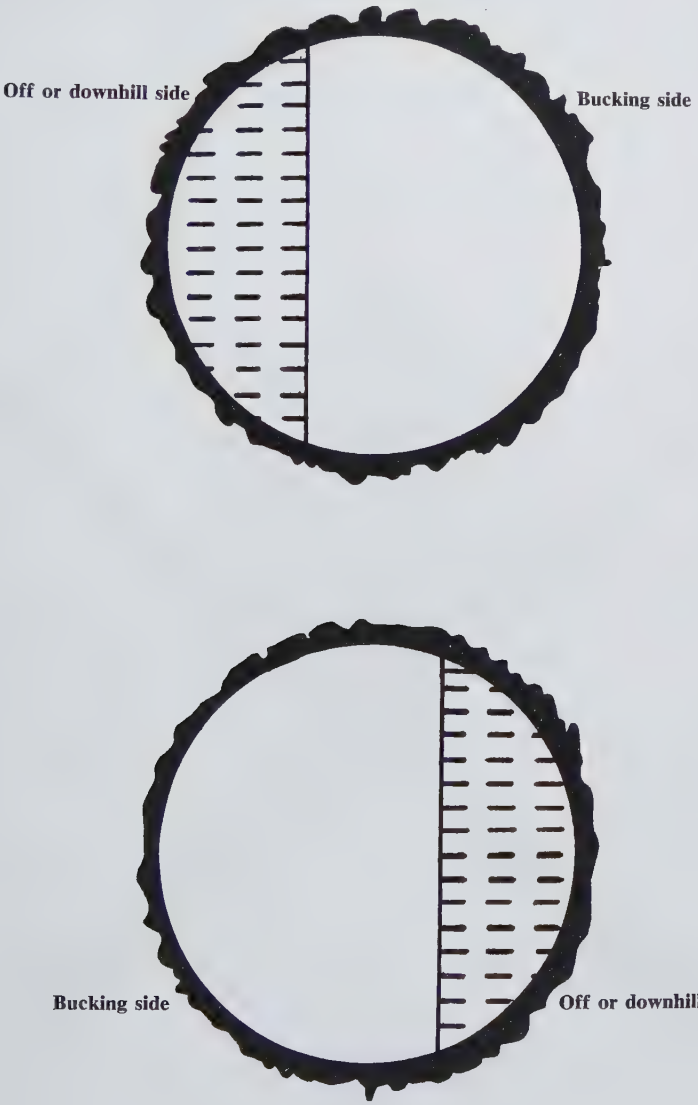
Many times the faller finds himself in an awkward position when he tries to buck some trees. Such positions should be avoided. As in the previous example, log lengths can be changed to give the faller a safer working stance.

On other occasions, the faller will position himself in an improper stance while bucking. Improper bucking stances include: standing with loose debris underfoot, standing on the tree while bucking, and failure to stand on one side of the saw. All of these situations may result in cuts from the saw chain. Each carries with it other potentially dangerous conditions. A bucking area, not properly swamped out, hinders the faller's opportunity to escape. Standing on the tree while bucking may cause the faller to be thrown off and under the log or tree. Failure to stand to one side of the saw while bucking opens the way to injuries from kickbacks.

CUTTING THE DOWNHILL SIDE OFF FIRST

The procedure for bucking logs suggests that the offside or downhill side always be cut off prior to initiating the completing cut. In each instance, the removal of the downhill side enables the final cut to be made on the safer, uphill side. Secondly, removal of the far side allows the faller to stand further back from the log when completing the cut. (Refer to Illustration 84). Being able to stand back takes the faller out of the extremely dangerous zone. In this danger zone, snap-backs and/or "drops" are the main source of injury. Standing back away from the cut provides the faller with a margin of safety.

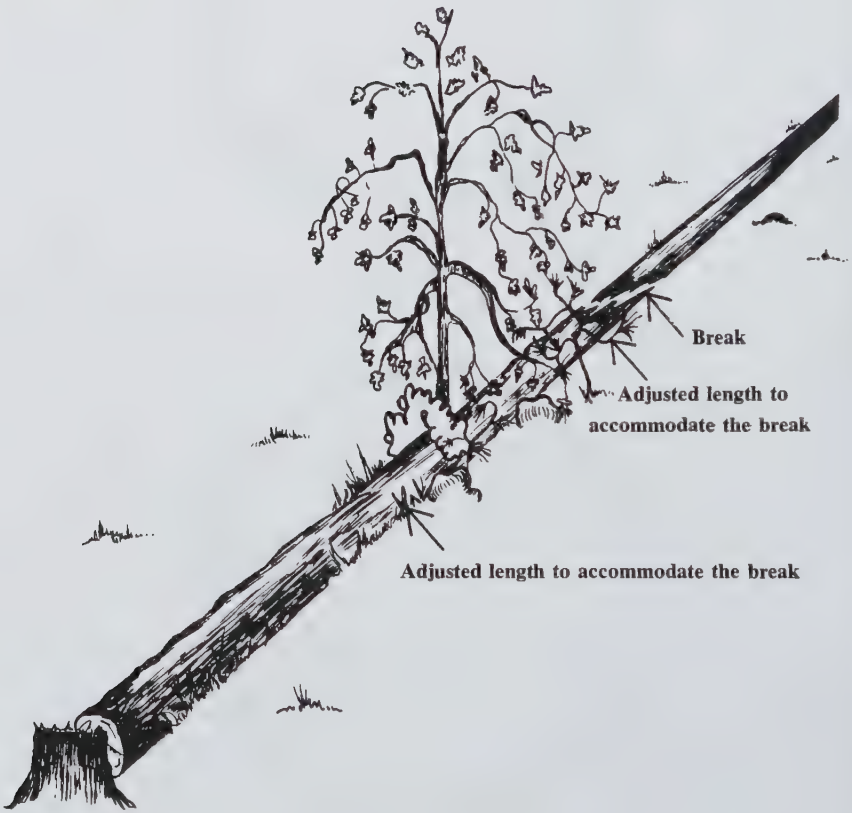
ILLUSTRATION 84
CUTTING THE DOWNHILL SIDE OFF FIRST



BUCKING FROM THE TOP TO THE BUTT

The process of establishing the exact location of each cut and then bucking from the top back to the butt is advantageous. The fact that the number and intensity of bind factors can be reduced is one of the major benefits. The second benefit of bucking from the top back toward the butt is shown in Illustration 85. The tree is broken about 6 feet past

ILLUSTRATION 85



BUCKING FROM THE TOP TO THE BUTT MAXIMIZES THE TREE — Bucking back to the butt the break is recognized and the log lengths are adjusted to recover as much of the tree as possible.

the first log length. If the faller does not realize the break and bucks the tree, he is left with a short log or wasted wood. Such a situation greatly reduces the amount of utilization possible, refer to Illustration 86.

ILLUSTRATION 86

WASTED WOOD BECAUSE OF BUCKING FROM THE BUTT TO THE TOP — The tree was bucked before the break was observed and as a result a section becomes waste.

If the faller makes it a practice to buck from the top back he can adjust his lengths accordingly. Therefore, realizing the presence of the break, the faller can take shorter logs. In doing so, he has maximized the amount of wood under the existing circumstances.

POST BUCKING SWING OR PIVOT

Post bucking swing refers to the movement of a log or tree once it has been sawn completely off. This movement is extremely dangerous even if anticipated. Many times the release cut will allow the severed end to swing or pivot. Due to the number of possible variables it is impossible to establish a standard procedure. However, a hint may be helpful. Buck from the top back to the butt. This sequence will give the faller an idea of what the tree will do when the final cuts are made.

GLOSSARY

AXE—A part of the faller's safety equipment which serves many pounding and chopping functions. Can also be used to plumb the lean of a tree.

BACKCUT—The last of the three cuts required to fall a tree. Located on the opposite side of the tree from the face and minimumly 2″ above the horizontal cut of the face. The 2″ is referred to as stump shot and prevents the tree from kicking back over the stump toward the faller. The backcut must never be continued to a point at which no holding wood remains. Variations of backcutting are discussed in: face-boring backcut, side-boring backcut, and side-notching backcut.

BAR—Long, thin projection of the chain saw upon which the saw chain travels. Improper use of the bar results in kickbacks and saw cuts. It is the extreme top and bottom of the bar's nose that is sensitive.

BARBER-CHAIR—Vertical split of a tree during the falling procedure. Generally a result of improper facing and/or backcutting. Characterized by a portion of the fallen tree being left on the stump.

BED OR CRIB—Prepared area upon which a tree is felled. Generally prepared by a bulldozer or skidder to minimize breakage of the tree.

BIND—Series of pressures in a felled tree resulting from objects (terrain, stumps, windfalls, etc.), which prevent the tree from lying flat on the ground. The two major components of bind are compression and tension. It is their directional pressures that determine the technique and procedure used while bucking.

BLOW-DOWN—Trees that have been blown down as a result of wind.

BORING—Method of using the nose or tip of the bar to saw into the tree while falling or bucking.

BOTTOM BIND—One of the five basic tree positions commonly encountered while bucking. A tree in a bottom bind situation is tensioned on the top and compressed on the bottom.

BUCKING—Process of sawing a felled tree into section called logs. Length of the log is dependent on the species of the tree and what type of product it will be made into.

BULLBUCK OR BULLBUCKER—Supervisor of the fallers. Among his responsibilities are assignment of fallers to working areas and insurance that work is done safely and efficiently.

BUSHELING—Method of payment in which the faller is paid for how many trees he falls and bucks. Generally the number of trees is converted into thousands of board feet and a specific amount paid for each thousand board feet.

BUTT—End of a felled tree that has been sawn from the stump.

BUTT LOG—Portion of a felled tree from the butt to the first bucking cut.

CALKS OR CHALKS—Heavy leather boots containing numerous steel calks or spikes. A part of the fallers safety equipment used to promote secure footing.

CAT-FACE—Scar or deformed section at the base of a tree caused by rot or fire.

CLEAR CUT—An area in which all of the trees have been or will be felled, bucked and skidded in one operation.

CONVENTIONAL FACE—One of the two types of faces commonly used to fall a tree. The face or undercut is taken from the butt of the tree.

CORNER-NIPPING—Special technique of partially cutting the extreme outside holding wood corners to prevent root pull, slabbing and alteration of the desired falling direction.

CORNERS—The extreme outside position of the holding wood on either side of the tree.

CROSSING THE LEAD—Intentional or unintentional falling of a tree across the established lead or falling direction. Although crossing the lead may be caused by wind, it generally is a result of improper falling technique.

CRUMMY—Vehicle used to transport fallers to and from the falling and bucking area.

CULL—A tree or log containing sufficient rot as to be considered unmarketable.

DAY WORK—Method of payment in which the faller is paid a specific amount for working a day.

DOGS—A metal plate containing 3 to 5 points or fingers which are located in front of the chain saw protruding parallel with the bar. Dogs allow the saw to be pivoted while falling or bucking.

DOMINO FALLING—Act of facing and backcutting two or more trees which are left standing and then attempting to knock them all down at once with one driving tree. A special technique that must be used cautiously and only in special circumstances.

DUTCHMAN—General reference made to special falling technique in which the constant relationships of the face, holding wood, and backcut are intentionally altered to solve a particular falling problem. (Refer to Kerf Dutchman, Step Dutchman, and Swing Dutchman).

END BIND—One of the five basic tree positions commonly encountered while bucking. An end bind situation occurs on steep terrain where the force of gravity closes the bucking cuts.

ESCAPE ROUTE—A predetermined path of exit used by fallers when falling or bucking. The essential components of an escape route are: selection of the desired direction and distance, prior to

falling or bucking and a well-cleared path through which to escape.

FACE—A section of wood sawn and removed from a tree's base. It's removal allows the tree to fall and assists in directing where it will fall. The face is comprised of two separate cuts which have constant relationships; the horizontal cut must be at least ⅓ the diameter of the tree, the sloping cut must be angled enough to allow a wide opening and the two cuts must not cross each other.

FACE-BORING BACKCUT—Special alteration of standard backcutting procedure used to handle particular trees such as those which are large or leaning heavily. Face-boring reduces the amount of wood remaining to be cut prior to the final backcutting.

FALLER—Specialist who falls and bucks trees in a safe manner while utilizing as much as the tree as possible. In some areas the faller only cuts the trees down and a bucker saws them into logs.

GUNNING OR SIGHTING — Technique of aligning the handle bars and/or gunning mark with the desired falling direction. Since the gunning mark and handle bars are at a 90 degree angle to the bar, exact position of the face, in relation to the desired falling location, can easily be established.

HANG-UP—Situation in which a tree is lodged in another and prevented from falling to the ground. Results from a number of causes such as improper facing and/or backcutting and wind. Can be very dangerous.

HEAD LEAN—One of the two natural leaning forces found in most trees. Head lean is the most prominent outward slant or lean of a tree in reference to its base.

HOLDING WOOD—Section of wood located between the face and the backcut. Its purpose is to prevent the tree from permanently slipping from the stump until it has been committed to the face. It also helps direct where the tree will fall. The holding wood must never be completely sawn off.

HORIZONTAL FACE CUT—First of the two cuts required to face a tree. Its depth is minimumly ⅓ the diameter of the tree and level.

HUMBOLDT FACE—One of the two types of faces commonly used to fall a tree. The face section is removed from the stump of the tree.

HYDRAULIC JACK PAD—Thick steel pad which is placed between the hydraulic jack plunger and butt of the tree to distribute the upward push over a larger area.

JACK-POT—An area in which the trees have not been felled in any particular lead or direction. Such a situation is a result of poor falling technique.

KERF—Space resulting from the cutting of a chain. The width of a cut is referred to as the kerf.

KERF DUTCHMAN—A special falling technique in which the constant relationships of the face, holding wood, and backcut are intentionally altered to solve a particular falling problem. The faller can, with the use of the Kerf Dutchman, force a tree to jump off the stump. If understood and properly used, the Kerf Dutchman can in specific instances solve problems of breakage, and crossing roads or creeks.

KICK-BACK—A strong thrust of the saw back toward the faller generally resulting from improper use of the nose of the bar or the pinching of the bar in a cut. Kick-back causes loss of control of the saw and this in turn results in numerous saw cuts each year. Kick-back also refers to a tree jumping back over the stump toward the faller. This kind of kick-back generally results from a tree being felled into standing timber and/or lack of stump-shot.

LAY—Refers to either the position in which a felled tree is lying or the intended falling place of a standing tree.

LEAD—Predetermined direction of falling the trees of a particular strip or area in regard to the relation of the trees to one another and their combined relationship to the surrounding terrain.

LEAN—Refers to the directional tilt of a tree away from its vertical position. Many times two lean forces may be in play in the same tree. They are referred to as head lean and side lean. The lean, or leans, of a tree can be easily established with the use of a plumb-bob or axe handle.

LEANER—A tree which naturally leans heavily.

LEG PROTECTOR—Ballistic nylon pad attached to one or both pant legs to protect the leg from contact with the chain. It can be attached to either the inside or outside of the pant leg.

LIGHTNING STRIKE—Tree that has been struck by lightning.

NO-BIND—One of the five basic tree positions commonly encountered while bucking. A tree in a no-bind situation is usually found in flat terrain.

OFFSIDE—The opposite side of the tree from where the faller stands while bucking or falling.

PEELER—Logs used for peeling into thin layers called veneer for the manufacture of plywood.

PLUMB-BOB—Special tool used to establish the outward lean or slant of a tree in relation to its base. Generally a lead weight attached to a piece of string is used.

PUSHER OR DRIVER—Use of a tree to drive or push over another that does not fall although it has been faced and backcut. Such a situation results if a tree hangs-up, sits back or is sky-bound.

RIGGING CREW—Crew and equipment that drags logs to an area called a deck or landing. From the deck, logs are loaded onto trucks for transport.

RIGGING CUT—The bucking of non-merchantable trees which have been felled or blown down to facilitate easier access to the area by the rigging crew.

ROOT PULL—The pulling out of a portion of a tree's root system. Generally a result of not cutting up the corners of the holding wood close enough on a large or heavily leaning tree.

RUSSIAN COUPLING—An incomplete bucking cut as a result of an unsafe bucking situation. In such an instance the faller only partially cuts through the tree. This situation can be very dangerous to the rigging crew. If a Russian coupling is left, the tree should be marked and supervisors notified.

SAW LOG—Logs taken to be manufactured in lumber.

SCHOOL-MARM—Natural dividing of a tree's base into two or more sections, and/or division of its top into two or more sections.

SET—Combination of two fallers, or one faller and one bucker working together.

SHOULDER PAD—Leather, canvas or felt pad threaded through the suspenders on one shoulder to protect the body from contact with a saw being carried.

SIDE BIND—One of the five basic tree positions commonly encountered while bucking. A tree in a side bind situation is compressed on one side and tensioned on the other.

SIDE-BORING BACKCUT—Intentional alteration of the standard backcutting procedure to prevent loss of control of a tree and/or its barber-chairing. Side-boring is an effective technique of reducing the amount of holding wood required to fall a tree. The nose of the bar is pushed into the tree behind the face and 2" above the horizontal cut.

SIDE LEAN—One of the two natural leaning forces found in many trees. Compared to head lean, side lean is the lesser pronounced lean.

SIDE-NOTCHING BACKCUT—Another intentional alteration of standard backcutting to prevent loss of control and/or barber-chairing. This method also reduces the amount of holding wood remaining to be cut by cutting each side prior to the final across-the-back severing.

SIDEWINDER—A limb or sapling that is bent under a tree that has been felled. Unintentionally cutting them is extremely dangerous. In some areas sidewinders refers to the falling of a tree in an unintended direction.

SINGLE-JACK—A faller who falls and bucks trees in an area by himself.

SIT-BACK—Refers to a tree that settles back on the stump closing

the kerf of the backcut. Generally a result of improper determination of the tree's lean and/or of wind.

SKY BOUND—Tree which fails to fall after being faced and backcut. Generally a result of picking the wrong lean.

SLABBING—Generally a result of improper technique and/or sequence of bucking cuts which result in a lateral split of a log.

SLIPSHOD—Poor procedure or technique of falling or bucking.

SLOPING FACE CUT—The second of the two cuts required to face or undercut a tree. It must be angled sufficiently to allow a wide-mouthed face opening. The sloping cut's location is above the horizontal cut when using the Conoventional Face and below the horizontal cut when a Humboldt Face is used.

SNAG—A dead or dying tree which is still standing. Snags must be felled prior to beginning work on an area. Special procedure must be observed when falling snags.

SNAP TOP—Broken off top of a tree as a result of wind and/or rot.

SPIKE TOP—Live tree that has a dead barkless top.

SPRING BOARD—Metal-toed plank used to elevate the faller above a large swelled but or to allow him to fall on extremely steep ground. A notch is sawn into the side of the tree and spring board toe inserted into it. The faller stands on this plank to face and backcut.

STAGGED OR BOBBED PANTS—Pants whose cuffs are removed and length shortened to facilitate unrestricted movement for working and escaping.

STEP DUTCHMAN—An intentional alteration of standard falling technique to solve problems of maintaining a lead. The Step Dutchman is put in play by sawing off the lean side holding wood and placement of a step (rock, wood) into the face to force the tree to pivot to the desired direction.

STINGER—Metal nail-like affair attached to the end of a logger's measuring tape. After inserted, it will secure one end of the tape allowing the faller to proceed down the tree to accurately determine the desired length of the log.

STRIP OR QUARTER—Designated area of trees established by natural boundaries (roads, streams, etc.), or ribbons within which fallers are assigned.

STRIP LAYOUT—Refers to the best method of falling the trees of an area in relation to themselves and the terrain. Strip layout is the faller's first consideration in the falling sequence.

STUMP SHOT—Two inches or more height difference between the horizontal cut of the face and the backcut. The difference in height establishes an anti-kick step that will prevent a tree from jumping back over the stump toward the faller.

SWAMPOUT—Refers to the clearing away from the base of a tree and bucking area loose debris which could hamper footing, use

of tools, and/or escaping. Preparing the working and escaping area is an essential part of the falling procedure.

SWING DUTCHMAN—A special falling technique which, when used properly, allows the faller to minimize breakage and maintain a lead. As with the Step Dutchman, this alteration of falling technique causes the tree to swing. The swing results because the holding wood on the lean side has been severed. The Swing Dutchman does not utilize a step and will not pivot a tree as much as will the Step Dutchman.

TEEPEE—Unintentional lodging of two or more trees in another standing tree generally caused by improper or poor falling technique.

THIRD FACING CUT—Special technique of making an "extra" facing cut to promote a proper face. Root protrusions, cat-faces and rot are some of the common sources which require a third facing cut.

TIN PANTS AND JACKET—Outside clothing generally made of canvas material which is water-proofed.

TOP BIND—One of the five basic tree positions commonly encountered while bucking. A tree in a top bind situation is compressed on top and tensioned on the bottom.

TRIM—An allowance of length added to the desired length of a log. (Example: desired length 17 feet, actual length cut 17 feet 6 inches).

UPROOTED—Trees that have been blown over as a result of wind.

WEDGE—A plastic or metal tool used by a faller to prevent a tree from falling backwards, redistribute a tree's weight to a desired direction and to prevent the bar from being pinched while bucking.

WEDGE OR PIE—A section sawn from a tree during the bucking sequence to allow for the directional pressures of various bind situations. Splits, slabs and excessive wood-pulling are minimized when a wedge is sawn.

WIDOW MAKER—Any loose overhead debris such as limbs or tree tops which may fall at any time. Widow makers are extremely dangerous and present the faller with a continual source of danger.

WINDFALLS—Trees that have been blown over as a result of wind.

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